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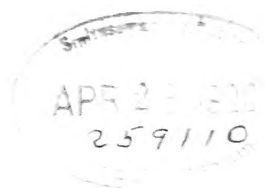
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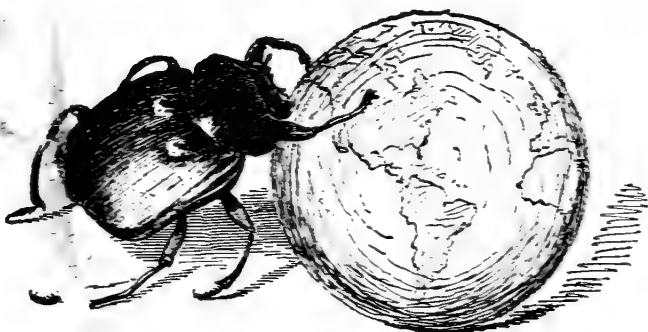
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## NEW YORK

# Entomological Society.

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MARCH, 1919.

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# JOURNAL

OF THE

## New York Entomological Society.

VOL. XXVII,

MARCH, 1919.

No. 1

### NOTES AND DESCRIPTIONS OF NORTH AMERICAN SERPHIDÆ. (HYMENOPTERA.)<sup>1</sup>

BY CHARLES T. BRUES,

FOREST HILLS, MASS.

The family Serphidæ, long familiar to entomologists as the Proctotrypidæ, includes a considerable number of very closely related species from many parts of the world. The group is well represented in the Nearctic region from whence numerous species have already been described. In going over material which has accumulated during a number of years, I have found a few undescribed forms which are described in the present paper.

The first North American species were early described by Say; a couple were added much later by Provancher, but the family received no serious attention at the hands of American entomologists till 1893 when Ashmead<sup>2</sup> published descriptions of all the known North American species. He included twenty-one species, all under the name *Proctotrupes* and considered the group as a subfamily. Since that time a number of species have been added, including some species of the genus *Disogmus* hitherto known only from Europe. Quite recently Kieffer<sup>3</sup> has subdivided the old *Proctotrypes* into four

<sup>1</sup> Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 128.

<sup>2</sup> Monograph of the North American Proctotryphidæ, Bull. U. S. Nat. Museum, No. 45.

<sup>3</sup> Ern. André, Spéc. Hym. Europe et Algérie, vol. 10 (1908), and Gen. Insect., Fasc. 95 (1909).

genera, *Serphus* (= *Proctotrypes*), *Cryptoserphus*, *Phanoserphus* and *Exallonyx*.<sup>4</sup> In the Genera Insectorum he has distributed the North American species in these genera, but has made a few errors owing to lack of North American material. Some of these I have been able to correct, although I have not been able to place definitely several species which I have not seen. In the genera *Serphus* and *Exallonyx* in addition to the descriptions of new species, I have appended keys for the separation of the Nearctic forms with the omission of a few that could not be located generically.

Many of the new species are from the far West, received from time to time from Professor A. L. Melander, who collected them mainly in Washington. From our present knowledge, it would appear that the family is better represented on the Pacific slope than in the eastern United States, although it is evident that the forms in the East are as yet far from all known.

The figures were all drawn by Mrs. C. T. Brues from camera lucida pencil sketches.

### *Serphus* Schrank.

#### KEY TO NORTH AMERICAN SPECIES.

1. Petiole of abdomen twice as long as thick; abdomen rufous except at tip.  
**melliventris** Ashm.
- Petiole of abdomen not longer than thick, usually shorter ..... 2
2. Antennal joints long, third joint over four times as long as thick .... 3  
Antennal joints shorter, the third only three times as long as thick; body  
black ..... **nevadensis** Kieff.
3. Head, and also most of the rest of the body, ferruginous or rufous... 4  
Head and thorax black, abdomen often rufous in considerable part ... 5
4. Rugosities of propodeum forming distinct longitudinal lines medially and  
basally, no distinct median longitudinal carina; propodeum black or  
piceous ..... **caudatus** Say.  
Propodeum irregularly rugose, but with a distinct median carina body en-  
tirely rufous or fulvous ..... **pallidus** Say.
5. Propleura with a large, smooth, shining area above the middle, irregularly  
striate elsewhere ..... 6  
Propleura without a large, smooth area; its entire surface irregularly  
striate or sculptured ..... **zabriskiei** sp. nov.
6. Propodeum irregularly rugose, with at most a median carina ..... 7  
Propodeum with the rugosities forming a series of longitudinal lines; pro-  
podeum long and gradually sloping; abdomen and most of legs reddish.  
**longiusculus** Brues.

<sup>4</sup> First described in Bull. Soc. Hist. Nat. Metz, vol. 11, p. 34 (1904).

7. Abdomen, except base and apex, ferruginous or bright rufous; legs yellow or honey yellow ..... 8  
 Abdomen black or sometimes partly dull rufous, legs strongly infuscated.. 10
8. Radial cell very short, not longer than the width of the radial vein.  
*linellii* Ashm.  
 Radial cell at least one third as long as the stigma ..... 9
9. Propodeum without any trace of a median longitudinal carina, gradually sloping behind ..... *rufigaster* Prov.  
 Propodeum with a median carina distinct at least at the base.  
*terminalis* Ashm.
10. Propleura with a broad, convexly raised longitudinal band extending along its upper portion, separated from the upper edge by a striated groove; abdomen brownish at the base ..... *sequoiarum* sp. nov.  
 Propleura flat or concave, without a raised band ..... 11
11. Abdominal petiole as broad as long; black with legs, except tibiæ and tarsi, piceous ..... *cockerelli* sp. nov.  
 Abdominal petiole transverse, much shorter than broad ..... 12
12. Malar furrow present ..... *florissantensis* Rohwer.  
 No malar furrow ..... *debilis* sp. nov.

***Serphus zabriskiei* new species. (Fig. 1.)**

♀. Length 6 mm. (exclusive of ovipositor). Black, abdomen ferruginous beyond the petiole; legs fulvo-ferruginous, four posterior coxæ piceous, lighter at tips, tegulæ fuscous; antennæ brown at extreme base. Head slightly more than twice as wide as thick; malar space slightly longer than the width of the mandibles at base, with a distinct furrow; clypeus broad, its anterior margin convex, its surface densely punctate. Eyes bare. Antennæ very slender; scape twice as long as thick, flagellar joints gradually shortened after the first, which is over five times as long as thick; penultimate joint three times as long as thick. Pronotum one-third as long as the mesonotum, transversely striate in front of the constriction; distinctly trilobed behind. Propleura obliquely striate on its lower half, irregularly longitudinally striate above, without the large, smooth space that is usually present. Mesopleura with a series of longitudinal striæ on its upper half in front of the convex portion, behind with a series of crenate punctures along the edge, which extend forward to form grooves on the posterior third of the lower half of the mesopleura. Propodeum coarsely rugose-reticulate, without areas or any trace of any longitudinal carina. Abdominal petiole quadrate, about as wide as long; second segment at base above with grooves as long as the petiole; ovipositor two thirds as long as the remainder of the abdomen, straight except at the tip, which is strongly curved downward. Legs slender, tarsal claws simple; longer spur of hind tibiæ one third as long as the metatarsus, the latter as long as the two following joints together. Wings tinged with brownish; radial cell very short, not longer than the width of the radial vein, the latter distinctly prolonged downward and surrounded by a small brown clouded area; discoidal vein indicated as a fuscous streak.

Described from a specimen collected by J. L. Zabriskie at Rochester, N. Y., June 10, 1905. Type in the American Museum of Natural History.

This species may be distinguished from other members of the genus of similar color by the sculpture of the propleura and propodeum and the form of the abdominal petiole.

**Serphus sequoiarum** new species. (Fig. 2.)

♂. Length 4.5 mm. Black; second abdominal segment, except apex, rufous-ferruginous; legs yellowish brown, anterior femora, tibiae and tarsi and middle tibiae light yellow, hind tibiae somewhat paler than their femora. Head two and one half times as broad as long, malar space as long as the width of the mandibles at base, with a distinct furrow. Clypeus broad, sparsely punctate, its anterior margin straight. Eyes bare. Antennal scape one half longer than thick; first flagellar joint twice as long as the scape, nearly five times as long as thick at apex; following joints decreasing very gradually in length, the penultimate over four times as long as thick and two thirds as long as the first; pronotum less than one third as long as the mesonotum, transversely striate in front of the constriction, trilobed behind. Parapsidal furrows indistinctly defined, but more prominent than usual. Propleura irregularly striate-reticulate anteriorly, smooth behind; its upper portion with a convexly raised band which is separated from the upper edge by a shallow groove or depression that is longitudinally striated and narrower than the elevated portion; the anterior end of the elevation forms the lateral lobe of the pronotum. Mesopleura longitudinally striated above in front of the raised portion and with a series of large punctures inside the posterior edge above the middle; below the middle these are elongated to form short horizontal striæ. Propodeum rugose-reticulate, with a complete median longitudinal carina, but without areas. Abdominal petiole as long as broad; grooves at base of second segment shorter than the petiole. Legs slender; longer spur of hind tibia one third the length of the metatarsus; tarsal claws simple. Wings very slightly tinged with brownish, radial cell very short, but longer than the width of the radial vein; both sections of this vein prolonged downward as brown streaks, the basal streak longer; cubital and discoidal veins indicated as brown streaks.

One specimen collected by Prof. A. L. Melander in the Muir Woods, Marin Co., California.

This species is easily recognizable by the peculiar conformation of the propleura and the conspicuously lighter color of the front legs and middle tibiae.

**Serphus cockerelli** new species. (Fig. 3.)

♂. Length 5 mm. Black; four anterior coxæ and all trochanters and femora piceous; tegulæ, tibiae and tarsi yellowish brown. Head somewhat

more than twice as broad as thick. Clypeus higher and less strongly narrowed below than usual, only twice as broad as high, anterior edge slightly arcuate, surface moderately punctate. Malar space longer than the width of the mandible at base, with a fine, distinct furrow. Antennæ slender; scape one half longer than thick; first four flagellar joints scarcely decreasing in length, each fully five times as long as thick; penultimate joint over four times as long as thick. Pronotum transversely striate in front of the constriction, trilobed behind, with the lateral lobes more prominent than the median one. Mesonotum with well marked vestiges of parapsidal furrows. Propleura irregularly and more or less obliquely striate on its lower anterior half; above with a series of five longitudinal striæ below the upper edge. Mesopleura striate between the raised portion and the tegulæ and anteriorly below; below with a series of punctures inside the edge and a small roughened area above the middle coxa. Propodeum coarsely rugose-reticulate, with a complete median raised line; long and very gradually sloping behind. Abdominal petiole as long as broad, roughly rugose, with a median channel above; striate-reticulate below; second segment with the grooves at base extremely short, shorter than the petiole. Legs long and slender; longer spur of hind tibia one third as long as the hind metatarsus; all tarsal claws simple. Wings faintly tinged with brownish; stigma moderately broad; radial cell nearly half as long as the stigma; both sections of the radial vein prolonged into the wing as brown streaks, each for a distance somewhat exceeding its own length; cubital and discoidal veins indicated as brownish streaks.

Type from Eldora, Colorado, August 18. Collected and sent me by Prof. T. D. A. Cockerell.

**Serphus debilis** new species. (Fig. 4.)

♂. Length 4 mm. Black; tegulæ, knees, front tibiæ and base and apex of four posterior tibiæ brownish yellow; abdomen beyond petiole dull rufous above, especially on the second segment. Head nearly two and one half times as long as thick; ocelli in a nearly equilateral triangle, the posterior ones much farther from the eye-margin than from one another. Malar space longer than the width of the mandible at base; no malar furrow; clypeus over three times as broad as high, its anterior margin nearly straight. Antennal scape twice as long as thick; flagellar joints gradually decreasing in length, the first nearly five times as long as thick; second somewhat stouter, four times as long as thick. Pronotum transversely striate before the constriction, lobed on each side behind; parapsidal furrows obsolete, but evident as slight depressions. Propodeum long, very gradually sloping behind, finely rugose, with a complete, but not strongly defined, median carina. Propleura finely longitudinally striate along its upper edge, below and in front irregularly rugulose-striate; mesopleura with a large, finely striated area below the tegulæ and a coarsely striated one in front below; punctures along hind margin prolonged as striæ on the lower half of the pleura; metapleura finely rugose throughout. Abdominal petiole transverse, seen from above less than

half as long as broad; strike at base of second segment close together, as long as the width of the petiole. Legs long and slender; longer spur of hind tibia slightly more than one third the length of the metatarsus; tarsal claws simple, wings slightly tinged with brownish; radial cell short, about twice as long as the width of the radial vein; second section of the latter prolonged downward as a brown streak; cubital and discoidal veins visible as pale brown streaks.

One specimen, Wawai, Washington, May 20, 1911, A. L. Melander.

This species presents no striking characters, but as indicated in the key to species is distinct; it seems to come nearest to *S. florissantensis* Rohwer with a paratype of which I have been able to compare it.

### **Cryptoserphus** Kieffer.

Kieffer<sup>5</sup> does not place any North American species in this genus, but some undoubtedly belong here as they have the abdominal petiole very short. They do not all show all the other characters attributed to the genus, however, and it may be necessary later to unite *Cryptoserphus* with *Phanoserphus* as has already been suggested by Dodd.<sup>6</sup>

**C. flavipes** Provancher. Faun Ent. Canada, Hymén., p. 562 (1883) (*Proctotrupes*).

**C. clypeatus** Ashm. Bull. U. S. Nat. Mus., No. 45, p. 339 (1893). (*Proctotrupes*.)

**C. abruptus** Say.

Complete works, vol. 2, p. 725 (1836). (*Proctotrupes*.)

Ashmead, l. c., p. 339. (*Proctotrupes*).

**C. obsoletus** Say.

Complete works, vol. 2, p. 725 (1836). (*Proctotrupes*.)

Ashmead, t. c., p. 340. (*Proctotrupes*).

**C. belfragei** Ashm.

Bull. U. S. Nat. Mus., No. 45, p. 340 (1893). (*Proctotrupes*).

**C. flavipes** Prov. (Fig. 5.)

Cannot be recognized from his description. As identified by Ashmead, it is easily recognized by its long radial cell and is a *Cryptoserphus*. I have specimens from Woods Hole, Mass., and Black Rock Mt., Ga. (3,500 ft.). In the far West there is another similar species described as *occidentals* on a later page of the present paper.

<sup>5</sup> Genera Insectorum, fasc. 95, p. 7 (1909).

<sup>6</sup> Trans. R. Soc. South Australia, vol. 39, p. 387 (1915).

**C. abruptus** Say. (Fig. 6.)

Is also not recognizable from the original description. As redescribed by Ashmead it can be easily identified, although he does not mention the unusually stout legs. The longer spur of the hind tibia is claw-shaped, being distinctly bent and considerably thickened and the hind metatarsus is scarcely longer than the two following joints together.

**C. obsoletus** Say.

As identified and redescribed by Ashmead it is also a *Cryptoserphus*, and as Say's description will not locate the species definitely, should be accepted as fixing the species.

The two following species may be added:

**Cryptoserphus occidentalis** new species. (Fig. 7.)

♀. Length 3-4 mm. Black; legs, base of antennæ and abdomen between the third segment and ovipositor brownish yellow. Head slightly more than twice as broad as thick when viewed from above; strongly narrowed below the eyes when seen from the front, the malar space as long as the width of the eye, the width of the clypeus, malar furrow indicated as a small fovea next the eye; anterior margin of clypeus straight or slightly concave. Antennæ slender, moderately long; first flagellar joint five times as long as thick; second to fifth growing gradually shorter, each about four times as long as thick; following growing shorter more rapidly, the penultimate a little more than twice as long as thick. Eyes bare. Pronotum nearly half as long as the head, finely transversely striate before the constriction; humeral angle with a prominent, rounded swelling. Mesonotum with short foveiform parapsidal furrows just behind the humeri, but not indicated elsewhere. Propodeum white pubescent, with a median and pair of lateral carinæ on its basal half, defining two large, smooth areas; also with an ill-defined petiolar area on the rather gradually sloping posterior face, which is reticulate; sides with an indistinct lateral carina extending from the spiracle. Pro- and mesopleura entirely smooth; metapleura in the middle with a large shining area bordered below and behind by a raised margin; depressed, finely sculptured and pale pubescent elsewhere. Abdominal petiole very short, concealed above by the margin of the second segment; base of second segment with numerous basal striæ half as long as the posterior trochanter. Ovipositor slender, slightly curved apically, as long as the basal three joints of the posterior tarsus. Legs slender, longer spur of posterior tibia distinctly more than half as long as the metatarsus. Wings hyaline, stigma not very broad; radial cell as long as the stigma along the costal margin; other nervures not indicated by streaks.

Four specimens: type and one other from Chatcolet Lake, Idaho,

Aug., 1915, the other two from Tacoma, Wash., Aug. 28, 1911. All were collected and sent me by Prof. A. L. Melander.

This species is very similar to the eastern *C. flavipes* Prov. in wing venation and length of the tibial spur. It differs most strikingly in the form of the head which is narrowed and lengthened below the eyes, making the malar space longer.

**Cryptoserphus melanderi** new species. (Fig. 8.)

♂. Length 3 mm. Black, highly polished; legs beyond the trochanters yellow-brown. Head twice as wide as long when seen from above; face strongly convex medially, but without a vertical ridge-like protuberance below the antennæ; clypeal foveæ much more deeply impressed than usual, forming deep pits; clypeus short and broad, with nearly straight lower margin, bulging below the foveæ. Malar space short, with a finely impressed furrow as long as the width of the mandible at base; front with a vertical impression between the base of the antennæ and eye. Antennæ rather stout, conspicuously whitish pubescent. Scape very thick, one half longer than wide; first flagellar joint about four times as long as thick at apex; second a little shorter and stouter; third and following scarcely shorter, but becoming appreciably more slender. Eyes very sparsely pubescent. Pronotum transversely striate before the constriction; behind with the lateral angle produced as a conspicuous, almost acute tubercle. Mesonotum with the parapsidal furrows impressed close to the anterior margin, entirely absent elsewhere. Depression at base of scutellum deeply foveate at each side. Upper face of propodeum with two smooth areas dorsally, these narrowed behind owing to the oblique lateral carinæ; outside of these with a transversely rugose oblong area behind each spiracle; posterior surface somewhat concave and constricted, coarsely reticulate. Pro- and mesopleuræ smooth, the latter with a line of coarse punctures inside its posterior margin; metapleura reticulate, smooth in front above. Abdominal petiole not visible from above; base of second segment above with numerous, fine, parallel grooves nearly as long as the posterior trochanter. Wings hyaline, stigma and veins brown; stigma broad, triangular; radial cell along the costa two thirds as long as the stigma; second section of radius prolonged obliquely downward as a brown streak, cubital and discoidal veins indicated by barely visible brownish streaks. Legs rather stout; longer spur of hind tibia as long as the metatarsus.

Three specimens from Pullman, Wash., May 18, 1909, collected and sent me by my friend Prof. A. L. Melander, for whom the species is named.

This is a very distinct species, recognizable by the deep clypeal foveæ, stout, evenly jointed antennæ, sharply tuberculate prothorax and rather long radial cell.



*Phænoserphus* Kieffer.

The only North American species belonging to this genus which I have seen is the following:

*Phænoserphus longipes* new species. (Fig. 9.)

♂. Length 4.8 mm. Black; legs honey yellow; hind coxæ black; base of middle coxæ and middle and hind trochanters fuscous; antennal scape yellow below. Head slightly more than twice as broad as long, strongly narrowed behind the eyes; clypeus short and broad, only one fourth as high as its greatest width; malar space one and one half times as long as the width of mandible at base, no malar furrow. Antennæ moderately thick, with long joints clothed with short pubescence; scape stout, nearly cylindrical, twice as long as wide; first flagellar joint about four times as long as thick; following gradually decreasing in length and thickness, the penultimate two thirds as long as the first and three times as long as thick. Pronotum greatly constricted at the middle, transversely striated in front; its hind angles produced into a distinct rounded swelling. Mesonotum with faint traces of parapsidal furrows anteriorly. Metathorax coarsely rugose-reticulate, with a median carina on its superior face and a somewhat indistinct rounded petiolar area behind; on each side of the median carina is a smoother space bounded by indistinct carinæ, but these basal areas are not clearly defined. Pro- and mesopleuræ entirely smooth and shining, the latter with a series of large foveate punctures inside its posterior edge. Metapleuræ rugose, without any smooth space. Abdominal petiole twice as long as broad seen from above, longitudinally ribbed and transversely rugose between the ribs; second segment long, narrow basally, at base with striæ less than the length of the petiole. Legs long, but not very slender, tarsal claws simple; longer spur of hind tibiæ barely longer than one third the length of the metatarsus. Wings distinctly tinged with brownish; stigma and radial veins fuscous, the cell about half as long as the stigma; both sections of the radial vein extending into the wing as brownish streaks; radial and cubital veins prolonged as brownish streaks.

One specimen from Almota, Wash., June 24 (A. L. Melander).

*Exallonyx* Kieffer.

## KEY TO NORTH AMERICAN SPECIES.

1. Antennal joints short; flagellum slightly thickened toward tip; penultimate joint quadrate or at least scarcely twice as wide as long; basal joints in male simple ..... 2
- Antennal joints elongate, flagellum distinctly attenuated toward tip; penultimate joint about three times as long as thick; basal joints in male frequently with a tooth on the external margin ..... 5
2. Head one and one half times as long as wide; eye removed from posterior margin of head by more than its greatest length. (Fig. 10.)

*angusticeps* Brues.

- Head but little longer than wide; eye removed from posterior margin of head by about its greatest length or less ..... 3
3. Ovipositor longitudinally aciculate, penultimate joint of antennæ quadrate. 4  
Ovipositor with scattered, elongate punctures; penultimate joint of antennæ twice as long as thick ..... **similis** n. sp.
4. Antennæ pale at base; median stria at base of second abdominal segment much longer than the lateral ones ..... **quadriceps** Ashm.  
Antennæ black or piceous throughout; striæ of second abdominal segment nearly equal in length ..... **femoratus** Ashm.
5. Males ..... 6  
Females ..... 19
6. Some of the basal joints of antennæ with a linear process or tooth near the middle of the external side ..... 7  
All joints of antennæ simple, without any projections or processes ... 15
7. First flagellar joint simple, cylindrical, second and several following joints with a process, legs honey-yellow ..... 8  
First flagellar joint as well as some of the following ones with a process. 9
8. Antennal flagellum black, eighth joint with a small, but distinct process; larger, western species 6 mm. (Fig. 12.) ..... **placidus** Brues.  
Antennal flagellum brown, no process on eighth joint; smaller, eastern species ..... **fuscicornis** n. sp.
9. Antennal flagellum black ..... 10  
Antennal flagellum yellow at base, fuscous apically, eastern species. **ashmeadi** n. sp.
10. Head decidedly less than twice as broad as thick when seen above ... 11  
Head approximately twice as broad as long ..... 14
11. Median carina of propodeum complete ..... 12  
Median carina of propodeum not extending to apex; processes on basal flagellum joints acute, dentiform ..... **dentaticornis** Kieff.
12. Propodeum with a smooth space on each side of the median carina at base ..... 13  
Propodeum without smooth spaces ..... **crenaticornis** Kieff.
13. First four flagellar joints with a process externally; fifth with a less distinct one ..... **fallacicornis** Kieff.  
First six flagellar joints with a process, seventh with a faint trace of one. **obscuripes** Brues.
14. Only the first five flagellar joints with a carinate process externally; malar furrow deeply impressed; mesopleura irregularly striate anteriorly. **pleuralis** n. sp.  
Seven or eight flagellar joints toothed or with processes; mesopleura entirely smooth and polished. (Fig. 16.) ..... **serricornis** Brues.
15. Head approximately twice as broad as long when seen from above ... 16  
Head decidedly less than twice as broad as long, strongly narrowed behind the eyes ..... 18
16. Petiole of abdomen long, twice as long as broad; antennæ yellow. **longiceps** Ashm.

Petiole of abdomen not longer than broad ..... 17

17. Propodeum strongly narrowed behind; antennæ not pale at base. (Fig. 17.)

simplicior Brues.

Propodeum gradually narrower behind; antennæ pale yellow at base.

*pallidicornis* n. sp.

18. Propodeum with a strong carina, especially prominent at the apex of its horizontal face, with large, smooth areas basally ..... *carinatus* n. sp.

Propodeum with the median carina evident, but not strong; basal smooth areas not clearly defined; head strongly narrowed below toward the mouth ..... *parvulus* n. sp.

19. Petiole smooth above and beneath ..... *grandis* n. sp.

Petiole longitudinally striate above and beneath .....longiceps Ashm. ♀.

*E. canadensis* and *E. simulans* Ashmead are not included in the above table. *E. californicus* Holmgren is also omitted, as I cannot identify it among the numerous forms from the west which have the flagellar joints dentate in the males. The form referred to this species by Ashmead<sup>7</sup> is evidently not Holmgren's species and is, I believe, the one described on a later page as *E. ashmeadi* sp. nov.

**Exallonyx similis** new species. (Fig. 11.)

♀. Length 2.5-3 mm. Black; tegulæ, and legs and antennæ in part, yellow; antennæ brownish yellow at base, darkened beyond the middle and fuscous toward apex; legs brownish yellow, the femora above, and hind tibiæ toward apex, dark; middle and hind coxæ piceous, except at apex. Head about as long as broad, gradually constricted behind the eyes. Eyes sparsely pubescent, removed by slightly more than their width from the posterior margin of the head when seen from the side; malar space as long as the width of the eye, without furrow; anterior margin of clypeus straight. Antennæ reaching to base of abdomen; scape twice as long as thick, narrowed at base; first flagellar joint slender, three times as long as thick at apex; second, third and following each scarcely shorter than the preceding, but growing stouter; second two and one half times as long as thick; penultimate twice as long as thick. Mesonotum long and narrow, highly polished; groove at base of scutellum broad and shallow. Propodeum with long horizontal face, abruptly declivous behind; rugose-reticulate on the sides and behind; with a strong median carina above, on each side of which is a smooth space that extends to the top of the declivity. Pro- and mesopleuræ entirely smooth except for several striæ on the mesopleura below and in front of the upper raised portion; metapleura rugose below, shining on upper third. Petiole of abdomen a little longer than wide, rugose above, coarsely striate below; second segment angularly incised at base, with a median stria as long as the petiole and several short lateral striæ; ovipositor acutely pointed, but little curved, as long as the hind metatarsus, sparsely punctate. Legs rather slender, longer spur

<sup>7</sup> Bull. U. S. Nat. Mus., No. 45, p. 338 (1893).

of hind tibia nearly one half as long as the metatarsus; claws of front and middle tarsi with a long appendage at base. Wings hyaline, without cubital or discoidal streaks; stigma light brown, not very broad, the radial cell short, its outer edge very oblique.

Type from Tacoma, Wash., August 28, 1911. Five other specimens from Burton, Wash.; Vashon, Wash.; Pullman, Wash.; and Berkeley, Cal., taken during June and August. All were collected and sent to me by Prof. A. L. Melander.

This species is similar to the eastern *E. quadriceps* Ashm., which it resembles very closely. It is at once separated by the absence of striae on the ovipositor. From *E. femoratus* Ashm. it is easily distinguished as set forth in the key to species.

**Exallonyx fuscicornis** new species. (Fig. 13.)

♂. Length 3.5 mm. Black; tegulae, palpi, scape of antennae and legs brownish yellow; front and middle coxae light brown; flagellum of antennae fuscous; hind coxae black. Head barely twice as broad as long, strongly narrowed behind; ocelli in a flat triangle, the hind ones farther from one another than from the eye-margin. Eyes removed from posterior margin of head by their own width, bare or nearly so; malar space as long as half the width of the eye, without furrow; head much narrowed below when seen from in front; margin of clypeus straight. Antennae reaching to basal third of second abdominal segment; scape twice as long as thick; first flagellar joint simple, without process, not quite three times as long as thick and subequal to the second, third and fourth; following slightly shorter, subequal, becoming more slender; second to seventh joints each with a carina externally on the basal half that forms a dentate process at the middle of the joint, those on the second and seventh less prominent. Mesonotum polished, without trace of parapsidal furrows; depression at base of scutellum broad and rather deep behind. Propodeum short, its horizontal face but little longer than the declivity; basally with an indistinct median carina, but with the basal smooth space very short; elsewhere rugose-reticulate. Propleura smooth. Mesopleura with a small striate area anteriorly near the base of the front coxa and with the lower punctures near its hind margin prolonged into short striae; metapleura with a very small, smooth space above. Petiole of abdomen wider than long, with a few coarse, irregular ridges above, coarsely striate below; basal striae on second segment coarse, of equal length, as long as the petiole. Legs stout, longer spur of hind tibia slightly over one half the length of the metatarsus; front and middle tarsal claws with a long, slender appendage at base. Wings hyaline tinged with brownish, cubital and discoidal veins very finely indicated as brownish streaks; stigma moderately broad; radial cell very short, the outer vein entering the costal margin at an angle of about 45°.

One specimen from Woods Hole, Mass., collected by the writer during July, 1902.

Distinguished from *E. ashmeadi* sp. nov., the only other species with dentate antennæ known from the Eastern states, by the simple first flagellar joint. It is quite possibly the male of some described species known only in the female sex, but I cannot associate it with any degree of certainty.

***Exallonyx ashmeadii*** new species. (Fig. 14.)

♂. Length 3.5-4 mm. Black; tegulæ, legs, and base of antennæ honey-yellow; middle and hind coxæ blackish on basal half; antennæ blackish on apical half. Head almost twice as broad as thick, not very much narrowed behind the eyes; ocelli in a flat triangle, the posterior pair as far from one another as from the eye-margin; seen from the side, the eyes are removed from the hind margin of the head by a little less than their width; malar space as long as half the width of the eye, with a delicately impressed furrow, deeper above near the eye. Clypeus with the anterior edge straight; head much narrowed below when seen in front view. Antennæ reaching to the base of the second segment of abdomen; first to sixth flagellar joints each with a carinate process externally, more prominent on the second, third and fourth joints, and very small on the sixth. Scape slightly more than twice as long as thick; flagellar joints gradually decreasing; first three times as long as thick; others in approximately the same proportion except the elongate slender last joint. Mesonotum smooth, much narrowed anteriorly, without trace of furrows; depression at base of scutellum narrow, deep. Propodeum sharply declivous behind, the horizontal portion much longer than the declivity; median carina distinct on horizontal face; smooth areas on each side of carina distinct, half as long as the carina; propodeum elsewhere rugose-reticulate. Pro- and mesopleuræ smooth, the punctures before the posterior edge of the latter not elongated below; metapleura with a round fovea and crescentic smooth space above. Abdominal petiole as broad as long, roughly sculptured above, coarsely striate below; second segment with the basal striæ short, of equal length, the lateral one widened into a broad depression behind. Legs long, rather stout; longer spur of hind tibia half as long as the metatarsus, claws of four anterior tarsi each with a long, stout appendage at base. Wings hyaline without cubital or discoidal streaks; stigma rather broad, radial cell half as long as the stigma, the vein entering the costa at an angle of about  $45^{\circ}$ .

Type and three other specimens from Machias, Maine, July 20, 1909; a fourth specimen from Eastport, Maine, July 14. All were collected by Mr. C. W. Johnson. Type in the collection of the Boston Society of Natural History.

I believe that this is the form mentioned by Ashmead from the Eastern states as *Proctotrupes californicus* Holmgren. It is distinct from any western form that I have seen.

**Exallonyx pleuralis** new species. (Fig. 15.)

♂. Length 4.8–5.2 mm. Black; tegulae and legs yellow, the anterior coxae blackish at base and the four posterior ones black except at extreme tips; middle and hind tarsi dark fuscous, except at base; pedicel of antennae rufous. Head fully twice as wide as long, considerably narrowed behind the eyes; ocelli in an equilateral triangle, the posterior pair closer to one another than to the eye-margin; seen from the side the eye is removed by its own width from the posterior margin of the head. Malar space less than half the width of the eye, with a deeply impressed furrow. Head not much narrowed below, the clypeus broad, its margin straight or somewhat concave; front above the antennae with a prominent depression on each side of the intra-antennal carina. Mesonotum sharply narrowed in front, posterior corner of pronotum with a pronounced convex elevation; no trace of parapsidal furrows; depression at base of scutellum deep. Propodeum coarsely rugose-reticulate, more finely so basally, but without any entirely smooth basal areas; median carina very indistinctly defined; in profile the declivity is gradual but rather steep posteriorly. Propleura smooth. Mesopleura with some oblique striae in front of the elevated portion and with a narrow band of longitudinal striae below it; the punctures along its posterior edge not elongated into striae. Metapleura with a shining space above. Petiole of abdomen quadrate, with coarse reticulations above and striae beneath; basal striae on second segment longer than the petiole, of equal length. Legs long and rather slender; longer spur of posterior tibia nearly half as long as the metatarsus; tarsal claws of four anterior legs with a long appendage at base. Wings very slightly tinged with brown; stigma large and broad, radial cell one half as long as the stigma, radial vein meeting the costa at an angle of much more than 45°, second section of radius prolonged downward as a brown streak; discoidal vein, and the cubital less distinctly, indicated as brownish streaks.

Type and two other specimens from Monroe, Wash., May 20, 1908. (A. L. Melander.)

This nice large species is most easily distinguished from related forms by the sculpture of the mesopleura and the absence of processes on the sixth and seventh flagellar joints.

**Exallonyx pallidicornis** new species. (Fig. 18.)

♂. Length 2.5–3 mm. Black; legs, including coxae, tegulae, palpi, and base of antennae pale brownish yellow; hind coxae at base, hind femora above and hind tarsi infuscated; antennae becoming darker toward apex; mesopleura below piceous. Head fully twice as broad as long, ocelli close together in a flattened triangle; posterior pair a little closer one to another than to the eye-margin. Seen from the side the eye is removed by somewhat less than its width from the posterior margin of the head. Malar space barely as long as half the length of the eye, with an indistinct furrow. Head considerably narrowed below; clypeus with a concave lower margin. Antennae

reaching to the basal third of the petiole of abdomen, all joints simple, cylindrical; scape narrowed basally, twice as long as thick; first joint three times as long as thick, distinctly longer than the second which is two and one half times as long as thick; following gradually growing shorter and thinner; penultimate two and one half times as long as thick. Mesonotum shining, without trace of parapsidal furrows; seen from above the sides of the thorax are concave in front of the tegulæ, due to the concave form of the propleuræ; posterior corners of pronotum not produced into distinct swellings or tubercles. Propodeum rugose with a distinct median carina on its upper face; sharply declivous behind; at the base with a small smooth area on each side which does not extend inward to the median line. Pro- and mesopleuræ entirely smooth; punctures inside the posterior margin of the mesopleura slightly elongated below; metapleura finely rugose, with an extremely small, smooth space above. Petiole of abdomen broader than long, irregularly sculptured above, coarsely striate below; grooves at base of second segment longer than the petiole, of nearly equal length. Legs slightly thickened, especially the posterior femora; longer spur of hind tibia one half as long as the metatarsus; tarsal claws of four anterior legs each with a long, very stout appendage at the base. Wings hyaline, stigma broad, radial cell nearly half as long as the stigma, the radial vein entering the costa at an angle of about 45°; disc of wing without streaks or traces of other veins.

Three specimens, the type from Putman, Conn., July 12, 1905 (H. L. Viereck); others from Wisconsin, October. (W. M. Wheeler.)

***Exallonyx carinatus* sp. nov.** (Fig. 19.)

♂. Length 3.5 mm. Black; antennæ piceous, tegulæ and legs beyond the trochanters fulvous; trochanters, except extreme tip and tarsi, fuscous, anterior coxæ yellowish at tips. Head about one half wider than long, full behind the eyes and then suddenly narrowed; ocelli in a slightly flattened triangle, the posterior ones as far from one another as from the eye-margin. Eyes removed by a little more than their own width from the posterior margin of the head. Malar space as long as half the width of the eye, with a distinct furrow. Head gradually narrowed below, the anterior margin of the clypeus strongly arcuate. Antennæ slender; scape narrow at base, twice as long as thick; flagellar joints simple, first considerably longer than the second, four times as long as thick; second and following decreasing in length, all about three times as long as thick. Thorax strongly narrowed in front, mesonotum smooth, without trace of parapsidal furrows; posterior corners of pronotum rounded, not produced; groove at base of scutellum broad and deep. Pro- and mesopleuræ smooth; the punctures inside the posterior margin of the latter very small above, larger but not elongated below. Propodeum long above, suddenly declivous behind, with a strong carina that is especially prominent on the declivity above and suddenly ends there; above on each side of the carina with a long triangular smooth area covering most of the dorsal face; elsewhere coarsely rugose-reticulate. Metapleura with a rather

large, raised, smooth space above. Abdominal petiole as long as wide, coarsely rugose above, striate below; striæ at base of second segment somewhat longer than the petiole, the lateral ones not so long as the median one. Legs not thickened; longer spur of hind tibia nearly half as long as the metatarsus; appendage at base of four anterior tarsal claws stout, shorter than the claw. Wings slightly tinged with yellowish or brownish; stigma broad, sub-triangular; radial cell one third as long as the stigma, radial vein meeting the costa at an angle of more than  $45^{\circ}$ ; other veins not indicated as streaks.

One specimen from Oroville, Wash., May 1, 1912 (A. L. Melander).

This species is readily distinguishable by the sculpture of the propodeum in addition to other characters given in the key to species.

**Exallonyx parvulus** new species. (Fig. 20.)

♂. Length 2-2.5 mm. Black; tegulæ yellowish brown, antennæ piceous, legs yellowish brown, but strongly infuscated on the trochanters and femora, and less strongly so on the tarsi of the four posterior legs. Head about one half broader than long, considerably and evenly narrowed behind; ocelli in a flattened triangle, the posterior pair equidistant from one another and from the eye-margin. Malar space nearly as long as half the width of the eye, with a distinct furrow. Head strongly narrowed below, the margin of the clypeus straight or slightly concave. Eyes sparsely pilose. Antennæ rather short and stout, especially at base; the flagellar joints simple; first three times as long as thick, considerably longer than the second, which is scarcely over twice as long as thick; following imperceptibly shorter and thinner, the penultimate, however, longer than the antepenultimate. Thorax narrowed in front of the tegulæ, its sides distinctly concave. Posterior corners of prothorax convexly elevated; mesonotum smooth without trace of parapsidal furrows. Impression at base of scutellum sharp and deep. Propodeum coarsely reticulate, its posterior face strongly declivous and not much shorter than the dorsal face; median carina distinct to apex, but stronger basally; smooth areas at sides of median carina distinct basally, but gradually passing over to the reticulate sculpture on the sides and behind. Pro- and mesopleuræ smooth; the punctures inside the posterior border of the latter enlarged into short striæ below the middle of the pleura; metapleuræ rugose below, smooth above, but the smooth space not clearly limited. Petiole of abdomen quadrate, irregularly sculptured above, coarsely striate below; grooves at the base of second segment of about equal length, longer than the petiole. Hind legs somewhat thickened; longer spur of hind tibia half as long as the metatarsus; appendage at base of the tarsal claws of the four anterior legs stout at base, as long as the claw. Wings hyaline, stigma narrowly triangular; radial cell nearly half as long as the stigma; radius entering the costa at an angle of less than  $45^{\circ}$ ; disc of wing without trace of any streaks.



The legs and antennæ vary in some specimens and are often lighter than in the type.

Thirteen specimens from widely scattered localities on the Pacific Coast. Type from Oroville, Wash., April 1. Others from Burton, Wash. (Aug. 19); Vashon, Wash. (Aug. 18, 1910); Chinacum, Wash. (Aug. 23, 1910); Colby, Wash.; Puget Sound, Wash.; Berkeley, Calif. (Aug. 8, 1915); Muir Woods, Calif. (Aug. 7, 1915). All but one were collected and sent me by Prof. A. L. Melander.

This is a small species without any striking peculiarities, but quite distinct as indicated in the key to species.

**Exallonyx grandis** new species. (Fig. 21.)

♀. Length 8.5 mm. Black; legs except middle and hind coxæ ferruginous; antennæ fuscous, rufous at base; middle coxæ dark rufous, hind coxæ black, except at apex; tegulæ fulvous; palpi brownish yellow. Head seen from above as broad as long, very slightly narrowed behind the eyes; triangularly produced in front of the eyes. In lateral view the eyes are removed from the posterior margin of the head by one and one half times their width. Ocelli in a nearly equilateral triangle, as far from one another as from the eye-margin. Eyes sparsely pilose. Malar space as long as the eye, without trace of any furrow. Clypeus not separated from the face medially, with very deep lateral foveæ, anterior margin straight, with a linear impression along the margin and a lanceolate one just above this. Antennæ of equal thickness throughout the flagellum; scape twice as long as thick; first joint of flagellum five times as long as thick; second three fourths as long; following gradually growing shorter, last only about a fourth longer than the penultimate. Thorax gradually narrowed in front; posterior corners of prothorax not tuberculate or swollen. Scutellar impression deep. Propodeum long, its upper surface gradually curving down to tip, with a strong, complete median carina, with a broad, smooth space on each side of the carina, becoming narrower behind and somewhat tuberculate on the posterior third, rugose-punctate laterally. Pro- and mesopleuræ entirely smooth; line of punctures along hind margin of latter enlarged into short striæ below the middle. Metapleuræ rugose-reticulate, with a small, smooth space above. Petiole of abdomen over twice as long as thick, tubular, but strongly arcuate, being bent up at each end; entirely smooth both above and below; second segment at base with only a median stria which is as long as the petiole; discal cicatrices oblique and lying close to the stria. Femora very stout; longer spur of hind tibia one third as long as the metatarsus. Appendage or tarsal claws of four anterior legs as long and about as stout as the claw. Wings distinctly tinged with brown; stigma narrow, small; radial cell nearly as long as the stigma; the radial vein entering the costa at an angle of about 45°. Cubital and discoidal veins indicated as brown streaks; second section of radius, and first to a less extent, prolonged as brown streaks into the disc of the wing.

One specimen from Ramsey, N. J., August 22, 1909. Type in American Museum of Natural History.

This fine large species is very similar to *E. longiceps* Ashm. in appearance, but is easily distinguished by the petiole of the abdomen being entirely smooth. The petiole is striate in both sexes of *E. longiceps*.

#### EXPLANATION OF PLATES I AND II.

Fig. 1. *Serphus zabriskiei* new species. *a*, apex of abdomen and ovipositor; *b*, stigma and cell; *c*, base of flagellum of antenna.

Fig. 2. *Serphus sequoiarum* new species. Stigma and cell of wing and base of flagellum of antenna.

Fig. 3. *Serphus cockerelli* new species. Stigma and cell of wing and base of flagellum of antenna.

Fig. 4. *Serphus debilis* new species. Stigma and cell of wing, and base of flagellum of antenna.

Fig. 5. *Cryptoserphus flavipes* Prov. Stigma and cell of wing and base of flagellum of antenna.

Fig. 6. *Cryptoserphus abruptus* Say. Stigma and cell of wing and base of flagellum of antenna.

Fig. 7. *Cryptoserphus occidentalis* new species. Stigma and cell of wing and base of flagellum of antenna.

Fig. 8. *Cryptoserphus melanderi* new species. Stigma and cell of wing and base of flagellum of antenna.

Fig. 9. *Phacoserphus longipes* new species. Stigma and cell of wing and base of flagellum of antenna.

Fig. 10. *Exallonyx angusticeps* Brues. Stigma and cell of wing and flagellum of antenna.

Fig. 11. *Exallonyx similis* new species. Stigma and cell of wing and base of flagellum of antenna.

Fig. 12. *Exallonyx placidus* Brues. Stigma and cell of wing and base of flagellum of antenna.

Fig. 13. *Exallonyx fuscicornis* new species. Stigma and cell of wing and second to sixth joints of flagellum of antenna.

Fig. 14. *Exallonyx ashmeadi* new species. Stigma and cell of wing and base of flagellum of antenna.

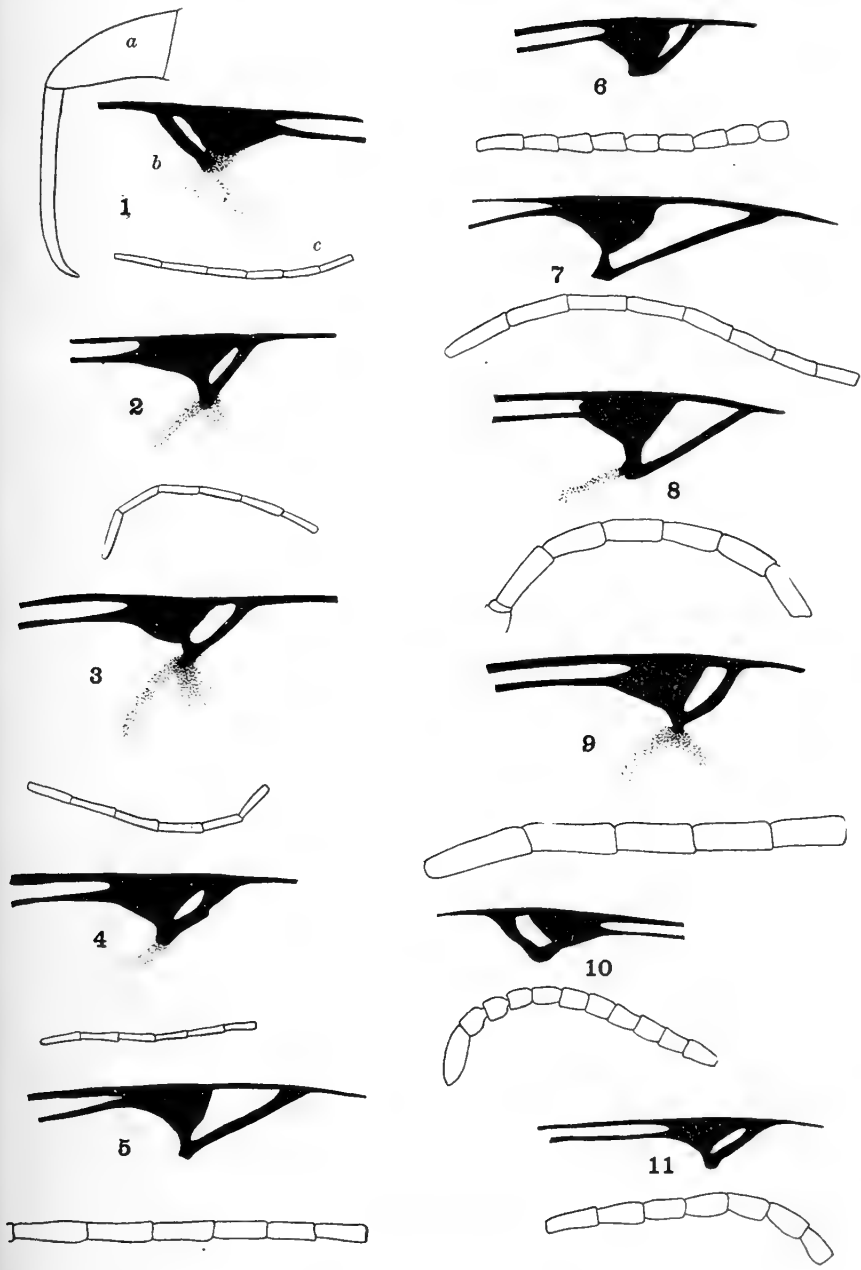
Fig. 15. *Exallonyx pleuralis* new species. Stigma and cell of wing.

Fig. 16. *Exallonyx serricornis* Brues. Stigma and cell of wing and base of flagellum of antenna.

Fig. 17. *Exallonyx simplicior* Brues. Stigma and cell of wing and flagellum of antenna.

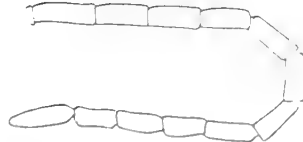
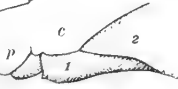
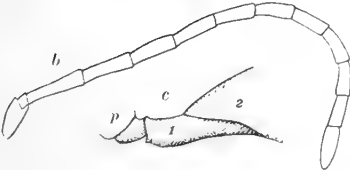
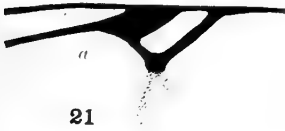
Fig. 18. *Exallonyx pallidicornis* new species. Stigma and cell in wing and flagellum of antenna.

Fig. 19. *Exallonyx carinatus* new species. Stigma and cell of wing and flagellum of antenna (first five joints above, last seven below).



Serphidæ.





Serphidæ.



Fig. 20. *Exallonyx parvulus* new species. Stigma and cell in wing and flagellum of antenna.

Fig. 21. *Exallonyx grandis* new species. *a*, stigma and cell of wing; *b*, flagellum of antenna; *c*, petiole of abdomen; (*p*, propodeum; *r*, petiole; *z*, second abdominal segment).

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## THE RESPIRATORY SYSTEM OF THE CAROLINA LOCUST (*DISSOSTEIRA CAROLINA* LINNE).<sup>1</sup>

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This paper is one of a series of contributions from the Entomological Laboratory of the Massachusetts Agricultural College, dealing with the anatomy of the grasshopper, *Dissosteira carolina* L. In its preparation I have received much encouragement and assistance from Dr. H. T. Fernald, Dr. G. C. Crampton and Dr. W. S. Regan, and I would take this opportunity of expressing my appreciation of their kindly interest and advice.

### HISTORICAL.

Aristotle (about 320 B.C.) propounded the theory that insects did not breathe, and it was not until the time of Malpighi (1669) that it was demonstrated that insects respire by means of internal tracheæ. The studies of Malpighi (1669) on the silk worm, of Swammerdam (1673) on the honey bee, and of Lyonet (1762) on the goat moth paved the way for later investigations, but the famous monograph of Straus-Durckheim (1828) on the anatomy of the cockchafer (*Melolontha vulgaris* L.) in which the tracheal system is treated in great detail, furnishes the basis for all modern work on the subject, such as that of Alt (1912) on the respiratory system of *Dytiscus marginalis* L., etc.

Among the works dealing with the respiratory system of Orthoptera in particular, may be mentioned the investigations of Marcel de Serres (1819) on *Truxalis nasutus*, Leon Dufour (1841) on the

<sup>1</sup>Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass. Portion of a thesis for the degree of Master of Science.

Anatomy of the Orthoptera, Hymenoptera and Neuroptera, and Miall and Denny (1886) on the cockroach. Packard (1878-1880) has given an excellent general description of the tracheal system of the red legged locust (*Meclanoplus femur-rubrum* DeG.), but his work is lacking in detail, and contains many inaccuracies, due no doubt to the fact that the dissecting microscopes available at that time were but crude implements in comparison with the perfected binoculars of to-day and even with the help of our improved appliances and technique, the tracing out of the various ramifications of the tracheal system requires much time and patience. Snodgrass (1903) has apparently described the general features of the tracheal system in *Dissosteira*, but his paper is not accessible to me and but few copies of it were ever printed. Therefore, since no detailed account of the respiratory system of any primitive insect is at present generally available, the morphology of the tracheal system of *Dissosteira* has been worked out in the present paper to fill this lack.

#### ORGANS OF RESPIRATION.

##### *A. External Organs or Spiracles.* (Plate III, Fig. 4.)

Ten pairs of spiracles are present in *Dissosteira carolina*, two pairs of which are located on the sides of the thorax and eight pairs on the abdomen.

##### *I. Situation.* (Plate III, Fig. 4.)

The first thoracic spiracle (*I*) lies in the lateral intersegmental membranous region connecting the pro- and meso-thorax, and beneath the hind lobe of the pronotum.

The second thoracic spiracle (*II*) is situated just above the second coxal cavity between the meso- and meta-thorax.

The first abdominal spiracle (*III*) lies in the auditory cavity just anterior to the tympanal sense organ. The other seven pairs of abdominal spiracles (*IV* to *X*) are all similarly placed on the lower anterior margin of each dorsal plate to the ninth abdominal segment where no spiracles are present.

##### *II. Morphology.*

In the Carolina locust three types of spiracles are found.

(a) *First Thoracic Spiracle.*—(Plate IV, Fig. 11.) This is by far the largest spiracle in the body and is closed externally by a large



two-lobed valve. The basal portion of the anterior lobe is prolonged somewhat posteriorly, forming a protruding pocket of the body wall. The aperture immediately within the valve is divided into two chambers, each of which leads to a separate main tracheal tube. Between these tracheæ is a chitinous septum (*stm*) which arises at the inner side of the posterior valvular lobe and extends anteriorly. Here it is thickened on its free end to which an occlusor muscle (*ocm*) is attached. Two valvular muscles are connected to an internal chitinous projection which arises at the lower anterior corner of the forward lobe. One muscle is inserted at the thickened end of the septum (see Fig. 11) and is the true occlusor muscle, while the other runs to the outer edge of the posterior lobe. As mentioned above two separate main tracheal tubes arise directly from this spiracle as shown in figure 11. The dorsal or larger air tube supplies the cephalic tracheæ, while the lower or smaller tube gives off its branches to the thoracic muscles.

(b) *Second Thoracic Spiracle*.—(Plate IV, Fig. 12.) This consists of an external two-lobed valve, the anterior lobe of which is considerably larger than the posterior one, and leads directly into a single main tracheal tube. Each lobe is somewhat triangular in outline and their opposing corners are connected internally by a chitinous cross band. The occlusor muscle (*ocm*) is inserted at the middle of this band and extends ventrally to a chitinous projection of the integument. The contraction of this muscle draws both lobes together.

(c) *Abdominal Spiracles*.—(Plate IV, Fig. 13.) These differ markedly from the thoracic spiracles, their external orifice being permanently open and leading directly into a shallow oval cup which communicates with a single main trachea. The occluding apparatus is quite different from those described above and consists of an internal hinged lobe at the apex of which the occlusor muscle (*ocm*) is attached. The abdominal spiracles are partly surrounded by a peculiar semicircular horny margin which is merely the infolded edge of the integument surrounding the spiracle. The occluding lobe (left lobe, Fig. 13) is drawn down upon this horny margin by the occluding muscle (*ocm*), thus cutting off the supply of air to the tracheal tube.

Each of the eight pairs of abdominal spiracles is constructed on

the above plan, the first and last merely differing from the others in their larger size.

### *B. Tracheal System.*

It is necessary to make a large number of dissections in order to obtain an accurate knowledge of this complicated system, for it is impossible by a single dissection to show all the tracheæ contained within the body.

In studying the tracheal system alcoholic specimens proved to be of very little value, as tracheæ filled with this fluid can be traced only with great difficulty. An attempt was made to fill the tracheæ with india ink, melted wax, and other substances, by submerging the insect in these materials and exhausting the air from the container, in the hope that atmospheric pressure would force these substances into the tracheæ when the air was again admitted, but these proved unsatisfactory. It was found that tracheæ containing air were very easily traced when dissected specimens were submerged in water, but this necessitated fresh insects.

After considerable experimentation the following method was devised for the preservation of locusts with air in their tracheæ.

The Carolina locusts were caught and killed in a cyanide bottle in the usual manner. At the close of a collecting trip these insects were placed in a desiccator on a wire gauze, the bottom part of which was partly filled with 8 per cent. formalin solution. This proved to be very satisfactory in preserving the air in the tracheal system and preventing the insects from hardening while the formalin gas liberated prevented molds and bacteria from breaking down the insect tissue.

#### *I. Structure of the Tracheæ.*

The tracheal system of insects originates in the embryo as tubular invaginations of the ectodermal layer, and therefore the fundamental structure is similar to that of the body wall. The tracheæ are elastic tubes lined by a chitinous layer corresponding to the chitinous exoskeleton of an insect, and are surrounded by an epithelial layer continuous with that of the hypodermis. The inner chitinous lining, called the intima, is thickened at regular intervals to form spiral threads, called tænidia, which are not continuous throughout the tracheal tube but are frequently broken. The tænidia function in

keeping the tracheæ permanently open without affecting their flexibility. These elastic threads are not found in the ultimate branches of the tracheæ, called tracheoles or in the air sacs.

## II. *General Morphology of the Tracheal System.*

A detailed description of this system would require a very lengthy paper. It is therefore advisable to consider only the more important tracheæ found in the Carolina locust in the present article.

The tracheal system of the grasshopper may be divided into three distinct parts—

- (1) Cephalic tracheæ.
- (2) Thoracic tracheæ.
- (3) Abdominal tracheæ.

These will be treated separately in the following pages.

### (a) *Cephalic Tracheæ.*

As we have seen, the first thoracic spiracle (Plate IV, Fig. 11) is composed of two chambers which give rise to two tracheal tubes. The upper chamber or larger opening leads into a large main tube which soon divides, forming two main tracheæ which run to the head. The dorsal branch, termed the superior cephalic trachea (Plate II, Fig. 1,  $I_1$ ) runs to the dorsal surface of the head and joins the ophthalmic trachea (Plate III, Fig. 5;  $ot$ ) surrounding the compound eye at the vertex (Plate IV, Fig. 10). The second branch, known as the median cephalic trachea, soon divides and sends a branch to the external lateral head muscles (Plate I, Fig. 5;  $I_{2a}$ ). This also connects dorsally with the superior cephalic trachea and ventrally with the anterior tentorial arm plexus ( $Tp$ ), as shown in Fig. 5. The other branch of the median cephalic trachea (Plate III, Fig. 1;  $I_{2b}$ ) passes through the occipital foramen with the alimentary canal and divides, forming two branches at the main body of the tentorium. One branch (Fig. 1,  $I_{2b}'$ ) travels along the anterior edge of the dorsal tentorial arm giving off numerous small branches to the muscles and ends in a large air sac ( $A$ ) situated over the alimentary canal (also see Plate IV, Fig. 14). The second branch of  $I_{2b}$  (Fig. 1,  $I_{b2}''$ ) extends forward and gives off a small branch closely applied to the proventriculus while the main tube runs to the under surface of the brain. Here it forms a large number of vesicular air sacs, which completely surround this organ. Just before the

median cephalic trachea divides to form its two main tracheæ running to the head a ventral branch is given off which unites with the inferior thoraco-cephalic trachea (Plate III, Fig. 1; *tc*). The thoraco-cephalic trachea (*tc*) enters the head just beneath the body of the tentorium (see Fig. 1 and Fig. 14), then curves laterally, giving off branches to the labium, maxillæ, and mandibles, while the main tube continues on and ends at the plexus situated at the junction of the anterior tentorial arm and external chitin (Fig. 5).

The following tubes constitute the more important tracheæ found in the head region.

The ophthalmic trachea (Plate III, Fig. 5, *ot*) surrounding the compound eye gives off numerous branches which supply the optic ganglia. A large sac-like tube (*gt*) originates from the ventral portion of the ophthalmic trachea and runs ventrally beneath the gena to the anterior tentorial plexus (*Tp*) previously mentioned. Connecting these tentorial arm plexuses is a large transverse dilated trachea which passes in the front of the head just above the junction of the clypeus and frons (Fig. 6). From this tube, branches are given off to the clypeus and labrum. Medially this transverse tube gives off a dorsal dilated air sac which supplies the front of the head and connects dorsally with both the ophthalmic and superior cephalic tracheæ.

All the above mentioned tracheæ receive air through the large chamber of the first thoracic spiracle, with the exception of the thoraco-cephalic trachea which receives air from the first, second and third spiracles (*I, II, III*) in a more or less indirect manner.

(b) *Thoracic Tracheal System.*

The thorax contains many muscles all of which must be intimately supplied with oxygen. This necessitates a large number of tracheæ whose arrangement is very complicated. The tracing of this system becomes very difficult because upon removing a muscle to expose the tracheæ beneath, a large number of the connections between the tracheal tubes of each layer are destroyed.

The tracheæ situated in the median sagittal plane will be discussed first (Plate I, Fig. 1). The other figures (Fig. 2 and Fig. 3) are drawn looking from within and removing one muscle layer at a time until the last layer is reached, which is drawn both from within (Fig.

3) and by removing the external chitin of the thorax (Plate IV, Fig. 7).

In general, tracheal tubes originate at the lower or smaller chamber of the first thoracic spiracle and pass backward between the muscle layers to the first abdominal spiracle (*III*) and connect with the second spiracular plexus at the different intersections of this plexus and the muscle layers.

The tracheal system of the thorax is best understood if two divisions are discussed separately: (1) Dorsal tracheæ which supply air to most of the thoracic muscles, and (2) ventral tracheæ which supply the head, nervous system and legs.

*Dorsal Thoracic Tracheæ.*—The median sagittal section and its air tubes will be discussed first (Plate III, Fig. 1). From spiracle *III* a branch is given off which runs to the median surface of the dorsal longitudinal muscles (*III-Ba*), where it divides into three branches which distribute themselves over the surface of these muscles, but all connect anteriorly with the main thoracic air sac *B* while still in the metathorax. This is the largest air sac found in the body and runs contiguous to the median surface of the dorsal longitudinal muscles, giving off many branches to these muscles. Just below the phragma, dividing the meta- and meso-thorax, this important air sac gives off a branch, which runs transversely beneath the dorsal longitudinal muscles and forms a compound plexus (*II-p*), receiving branches of the thoracic tracheal system at the different muscle levels, and finally connecting with the second thoracic spiracle. Anteriorly another ventral branch is given off by air sac *B* which joins indirectly the smaller chamber of spiracle *I*. This completes the dorsal thoracic tracheæ shown in Fig. 1.

On the lateral surface of the dorsal longitudinal muscles two arched tracheæ are found supplying air to these muscles. These are only partly shown in Plate III, Fig. 2. One of these originates at spiracle *I* (*I-D*) and connects posteriorly with air sac *D*, situated just anterior to the phragma dividing the meso- and meta-thorax, which in turn is joined ventrally with plexus *II-p*. The lateral side of the longitudinal muscles of the metathorax is furnished by an arched tracheal tube which originates at *II-p* (Fig. 2, *II-III a*) and ends at spiracle *III*.

Upon removing the dorso-longitudinal muscles of Fig. 1 the tracheæ shown in Fig. 2 are exposed. From spiracle *I* two main tubes run contiguous to the dorso-ventral muscles of the mesothorax (*I-II*  $b_1$ , *I-II*- $b_2$ ) and each terminates at the second spiracular plexus *II-p*. A trachea *II-III*- $b_1$  originates at *II-p* and runs dorsalward in the metathorax contiguous to the dorso-ventral muscles and continues over the dorsal edge of these muscles, connecting with a small air sac shown in Plate III, Fig. 3, *E*, which in turn is indirectly united with spiracle *III*.

Upon removing the dorso-ventral muscles shown in Fig. 2 the more complicated tracheal system shown in Fig. 3 is exposed. In general this consists of a single principal trachea, *I-II*-*c*, which connects spiracle *I* with *II-p* and a trachea *II-III*-*c*, which connects *II-p* with spiracle *III*. In the mesothorax *I-II*-*c* gives off a ventral tube which connects with the tube *g* shown in Fig. 1. At the middle of *II-III*-*c* the main meta-thoracic trachea of Fig. 2 (*II-III*- $b_1$ ) after passing through the air sac *E* joins the tracheal system of figure 3. Ventrally *II-III*-*c* gives off an air sac *F* which connects with the sub-ventral trachea *w* of Fig. 1. The other trachea which is given off ventrally by *II-III*-*c* supplies tracheoles to the muscles. At *III* (Fig. 3) is shown a tube (*tc*) which runs antero-ventrally and is the origin of the thoraco-cephalic trachea (*tc*, Fig. 1).

In Plate IV, Fig. 7, are shown the tracheæ which lie just under the layer of muscles shown in Plate I, Fig. 3, but these have been drawn by removing the exoskeleton of the thorax. In Fig. 3 the second spiracular plexus continues ventrally and connects with the main spiracular trachea, as shown in Plate II, Fig. 7. Another branch from air sac *D* also connects with this main tube. The air sacs shown in Fig. 7 will not be discussed, as reference to the figure will explain their significance in supplying air to the dorso-ventral muscles. From spiracle *II* a ventral branch is given off which soon divides, sending one branch into the mesothoracic leg ( $I_2$ ), while the other branch is connected with air sac *C* of Fig. 1. From spiracle *III* a branch is sent into the hind leg ( $I_3$ ), while another connects with the air sac *F*, the other side of which has been shown in Fig. 3. From the smaller chamber of spiracle *I* a trachea is given off which runs to the fore leg and another main branch which runs to the

superventral trachea *I-II-b<sub>2</sub>* (Plate III, Fig. 1). The main spiracular trachea also runs dorsally, giving off a branch which gives rise to the tracheæ of each muscle layer.

*Ventral Thoracic Tracheæ.*—Thus far only the dorsal thoracic tracheæ have been considered, but all the important points connecting these two systems have been noted.

The main tube running antero-ventrally from spiracle *III* (Plate III, Fig. 3, *tc*) and continuing forward through the thorax (Fig. 1, *tc*) to the head is the thoraco-cephalic trachea. This tube extends along each side of the ventral nerve cord to which it gives off many branches. A superventral branch (*I-II-b<sub>2</sub>*, Fig. 1) arising from spiracle *I* runs posteriorly, giving off a branch which forms an air sac *C* (Fig. 1), which in turn is almost directly connected with spiracle *II* (see Plate IV, Fig. 7, and Plate III, Fig. 3). Near this air sac another branch is given off (Fig. 1, *g*), which connects with the ventral mesothoracic trachea given off by *I-II-c* of Fig. 3. Other branches of this trachea run into the metathoracic muscles, where they repeatedly divide, while the main tube (*II-h<sub>2</sub>*) continues on and enters the metathoracic leg. An anterior branch is given off near air sac *C*, which supplies air to the salivary glands located in the mesothorax. An air tube *w* (Fig. 1), which arises from the lateral spiracular trachea of the abdomen between spiracles *III* and *IV*, runs forward and joins with air sac *F* (Plate III, Fig. 3).

### (c) *Abdominal Tracheal System.*

In comparison with the cephalic and thoracic tracheal system that of the abdomen is simple. From each abdominal spiracle short air tubes connect with a main longitudinal spiracular trachea (*spt*, Fig. 8, and Fig. 9), which extends from spiracle *X* forward on each side of the abdomen to spiracle *III*. From this spiracular trachea originate all the branches found in the abdomen. Typically in each segment of the abdomen bearing a spiracle, three main tubes are given off by the spiracular trachea of that segment. One runs dorsally to connect with an undulating longitudinal dorsal trachea and soon after leaving the spiracular trachea gives off a branch which becomes distended, forming a large air sac which is connected with the air sac of both the preceding and following segments. A ventral branch is also given off by the main spiracular trachea which unites with the

ventral tracheal system. In addition to the dorsal and ventral branches a median tube is given off which supplies the alimentary canal with its tracheæ.

In describing the abdominal tracheal system three main divisions are recognized: (1) Dorsal, (2) ventral, and (3) alimentary tracheæ.

*Dorsal Abdominal Tracheæ*.—(Plate IV, Fig. 8.) In each segment of the abdomen bearing a spiracle, a dorsal branch, the dorso-segmental trachea, is given off by the main spiracular trachea. These branches connect dorsally with a right and left dorsal abdominal trachea (*da*), which runs in close approximation to the alary muscles of the heart. The dorsal abdominal trachea extends from spiracle *III* to beyond spiracle *X*, the latter spiracle being connected with this tube by three dorsal segmental tracheæ instead of one. The right and left dorsal abdominal tracheæ are independent and are in no way connected by transverse tubes.

The abdominal air sacs are closely associated with both the dorsal and alimentary tracheal systems. There are eight of these sacs on each side which originate as branches of the dorso-segmental tracheæ and those of each side are all connected by a longitudinal trachea which runs along the top of the alimentary canal and reproductive organs. These are usually found imbedded in the fat body. Over the ileum in the sixth abdominal segment the right and left longitudinal trachea connecting the air sacs unite to form the ileal plexus (*Ip*). The air sacs arising from spiracles *IX* and *X* join directly with this plexus as shown in Fig. 8.

*Ventral Abdominal Tracheæ*.—(Plate IV, Figs. 8 and 9.) In the dorsal abdominal tracheal system the two dorsal abdominal tracheæ run contiguous to the alary muscles of the heart, but are in no way connected with each other. In the ventral system a single ventral segmental tube is given off by the spiracular trachea in every segment bearing a spiracle. This segmental tube runs ventrally to join a ventral abdominal trachea (*va*), situated on each side of the nerve cord in every segment bearing a spiracle. Instead of the right and left ventral abdominal trachea being separate they are joined by a transverse tube which runs beneath the nervous system. This ventral system gives off many branches to the nerve cord and at its posterior extremity these tracheæ give rise to branches which supply



the genital organs (*x*). Anteriorly this system ends in small air sacs situated in the first abdominal segment.

*Alimentary Canal Tracheal System.*—(Plate V, Fig. 16.) With the exception of a short branch of *I 2b*" (Plate III, Fig. 1), which is contiguous to the proventriculus, all of the tracheal tubes connecting with the alimentary canal arise from the abdominal spiracles. From spiracle 3 two air tubes run to the alimentary canal, one connecting with the lateral alimentary trachea (*lr*), the other connecting with the superior alimentary trachea (*sp*). These longitudinal tubes, the lateral and superior alimentary tracheæ, are situated between the coecal pouches and are continued posteriorly in a more or less indefinite manner until opposite spiracle 8, where they unite to form a single tube which connects with spiracle 10. The superior alimentary trachea gives off many branches between its connections with spiracles 6 and 8, which enter the reproductive organs. The two branches given off by spiracle 3 supply the dorsal and lateral sides of the alimentary canal in the vicinity of the cœca, while the single branch given off from spiracle 4 supplies only the ventral portion of this region. From spiracles 5, 6, 7 and 8 two branches are sent to the alimentary canal, one, a dorsal tube connecting with the superior alimentary trachea (*sp*), the other a ventral branch supplying the ventral side of this canal. Spiracle 9 supplies a ventral tube running beneath the ileum, and a dorsal dilated tube which connects with the ileal plexus (*Ip*). From spiracle 10 many branches arise which supply tracheæ to the digestive canal and to the muscles of the reproductive organs. The most important trachea given off by this spiracle is a dilated tube which connects with the ileal plexus (*Ip*).

In Plate V, Fig. 16, the alimentary tracheal system has been drawn only for the left side. On the right side the air sacs which occur in the abdomen have been figured. These are also shown in Plate IV, Fig. 8.

The air sacs on each side of the abdomen are connected by a longitudinal tube which joins posteriorly the ileal plexus (*Ip*). This plexus, then, consists of six more or less dilated tubes which unite just anterior to the rectum and above the ileum.

In Fig. 16 only the right half of the rectum has been drawn in order that the origin of the tracheæ which appear on it may be better shown on the left side.

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## TERMINOLOGY.

*Spiracle Terminology.*

*I*—First thoracic spiracle.

*II*—Second thoracic spiracle.

*III*—First abdominal spiracle.

*IV-X*—Second to eighth abdominal spiracles.

*stm*—Septum.

*ocm*—Occluding muscle.

In Fig. 16 Arabic numerals (3 to 10) are used instead of Roman numerals to represent the spiracles.

*Tracheal Terminology.*

Air sacs.

*A*—Cephalic air sac.

*B*—Main thoracic air sac.

*C*—Air sac connecting with spiracle *II*.

*D, E* and *F*—Other air sacs found in thorax.

Tracheal Tubes.

(a) Head.

*I*<sub>1</sub>—Superior cephalic trachea.

*I*<sub>2</sub> (*a* and *b*)—Median cephalic trachea and branches.

*gt*—Genal trachea.

*ot*—Ophthalmic trachea.





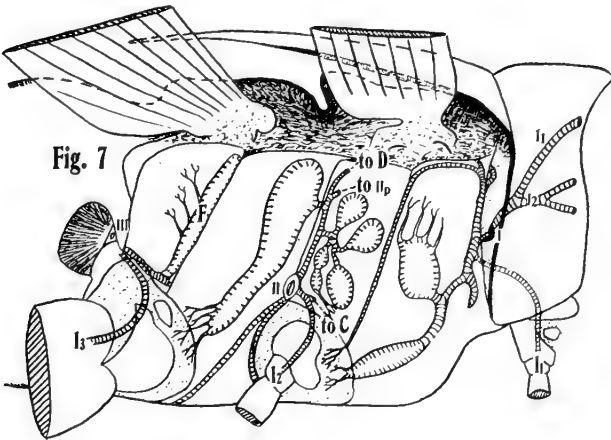


Fig. 7

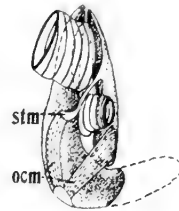


Fig. 11

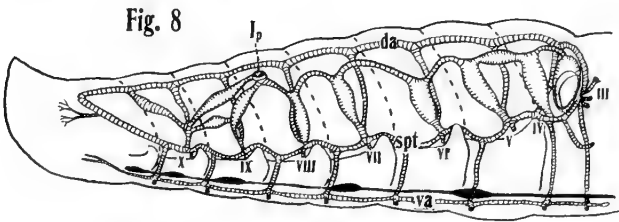


Fig. 8



Fig. 12

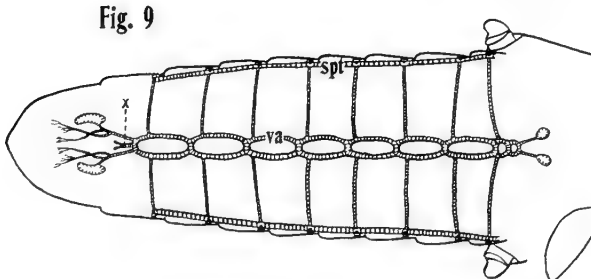


Fig. 9

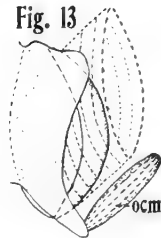


Fig. 13

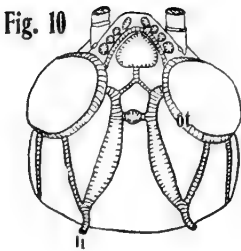


Fig. 10

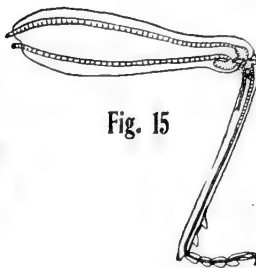


Fig. 15

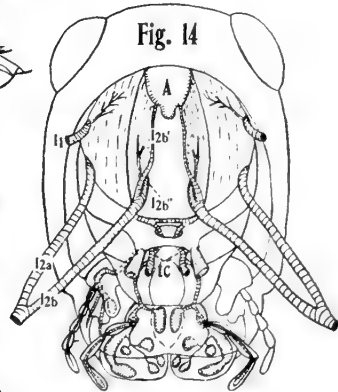
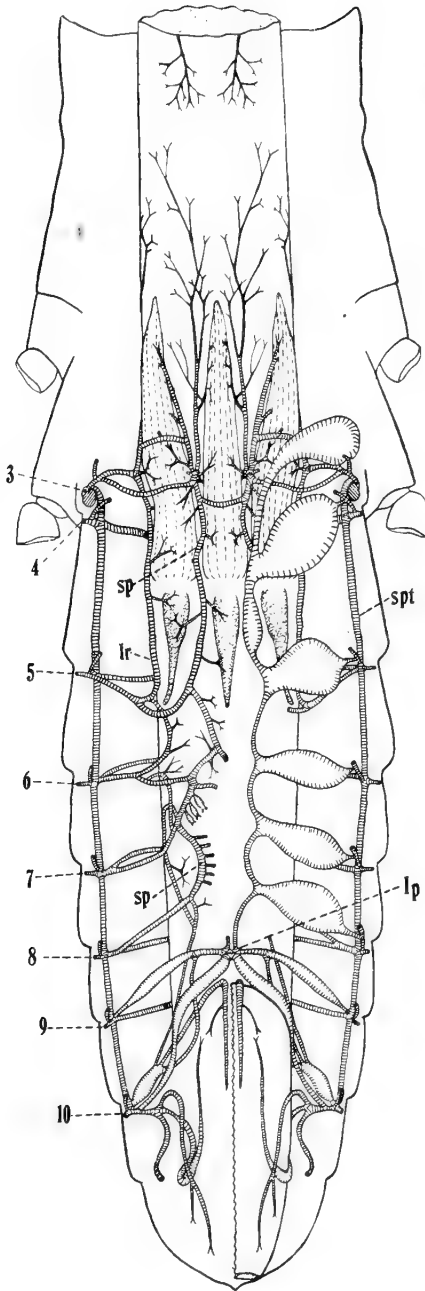


Fig. 14

Dissosteira carolina Lin.





*Dissosteira carolina* Lin.





*tc*—Thoraco-cephalic trachea.

*Tp*—Anterior tentorial arm plexus.

(b) Thorax.

*alc*—Trachea to alimentary canal.

*g*—Trachea connecting with I-IIc (Fig. 3).

*I<sub>1</sub> I<sub>2</sub> I<sub>3</sub>*—Pro-, meso-, and metathoracic leg trachea.

*Itp*—Second spiracular plexus.

*tc*—Thoraco-cephalic trachea.

*α*—Trachea connecting with air sac *F*.

Tracheæ found between the thoracic muscles are designated by combining two Roman numerals. *I-II-b* = a trachea connecting spiracle *I* with spiracle *II*. The letters *a*, *b* and *c* denote the muscular layer in which these tubes appear. Fig. 1 = layer *a*; Fig. 2 = layer *b*; Fig. 3 = layer *c*.

(c) Abdomen.

*da*—Dorso-abdominal trachea.

*Ip*—Ileal plexus.

*lr*—Lateral alimentary trachea.

*sp*—Superior alimentary trachea.

*spt*—Spiracular trachea.

*va*—Ventro-abdominal trachea.

*x* (Fig. 9)—Trachea supplying air to reproductive organs.

*I-X* or *3-10*—See Spiracle Terminology.

#### EXPLANATION OF PLATES III-V.

Fig. 1. Median sagittal section of head and thorax.

Fig. 2. Longitudinal dorsal muscles of the thorax removed from Fig. 1 to show the dorsal tracheæ lying beneath.

Fig. 3. Muscular layer shown in Fig. 2 removed to show the tracheæ and muscles in the next layer. This is an internal view of the lateral thoracic muscles.

Fig. 4. Situation of the spiracles.

Fig. 5. Side view of head showing tracheæ.

Fig. 6. Front view of head showing tracheæ.

Fig. 7. External view of lateral muscles shown in Fig. 3.

Fig. 8. Sagittal section of the abdomen with the digestive canal removed to show the abdominal air sacs, dorsal and ventral tracheal systems together with the spiracular trachea.

Fig. 9. Ventral abdominal tracheal system.

Fig. 10. Dorsal aspect of head showing tracheæ of this region.

Fig. 11. Internal view of the first thoracic spiracle situated on the right side of the body.

Fig. 12. Internal view of the second thoracic spiracle situated on the right side of the body.

Fig. 13. Internal view of the abdominal spiracles situated on the right side of the body.

Fig. 14. Posterior view of the head showing main tracheæ entering the occipital foramen from thorax, also the tracheal system of labium and maxillæ.

Fig. 15. Tracheæ found in the metathoracic leg.

Fig. 16. Dorsal aspect of the digestive canal showing on left side the alimentary tracheæ and on the right side the abdominal air sacs.

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## NEW SPECIES OF SERICA (SCARABÆIDÆ).—I.

BY R. W. DAWSON,

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Two years ago, while determining the Scarabæidæ contained in the collection of the Department of Entomology, University of Nebraska, the writer became interested in the genus *Serica*. It was at once apparent that the material at hand could not be named from the existing literature relating to this genus. In some cases the species were obviously new, in others several species seemed to answer equally well to the very brief and general descriptions, and it was impossible to tell which were new and which were not. Further than this, the writer was unable by external characters alone to satisfactorily divide the series before him into definitely marked species, regardless of names. However, some very surprising and encouraging discoveries were made by examining the genitalia of several species. As a result of these studies the task of working out a monographic revision of the genus was undertaken. Up to the present time between two and three thousand specimens, coming from many parts of the United States and Canada, have been studied.

Special acknowledgment should be made to Messrs. Leng, Blatchley, Casey and Skinner for permitting me to examine and dissect valuable type material, and to Mr. Gilbert Arrow for comparing specimens for me with the American types in the British Museum. In fact it is only through this generous assistance that any real progress has been made in applying the published names.

The large amount of time necessary for making the almost countless dissections and numerous drawings required for this work, compels the writer to return much borrowed material, and publish the descriptions of a number of new species before the study can be

completed. It is hoped, however, that the descriptions and figures of the new species will stimulate an interest in this long neglected genus and ultimately result in a far more complete review than would otherwise have been possible.

All types, unless otherwise noted, are deposited in the collection of the Department of Entomology, University of Nebraska.

***Serica campestris*** new species.

♂. Length, 8.5 mm., width, 4.5 mm. Color very dark mahogany, upper surface bare, polished and shining, without any trace of sericeous or pruinose lusters; however, the propygidium, basal margins of pygidium, sixth sternite and sides of the preceding sternites, anterior coxæ and lower half of anterior femora lightly pruinose.

Clypeus slightly, or not at all depressed below the level of the front, lateral margins moderately elevated, the anterior margin more suddenly and strongly elevated, moderately sinuate at the middle; the lateral incisure acute and only moderately strong; discal area very slightly tumid just below the middle; evenly and closely punctured, the punctures separated by one half to two thirds their own diameters. Clypeal suture fine but distinct. Front and occipital area less densely and regularly punctured, the punctures contiguous to separated by three times their own diameters. Antennal club about equal to the total length of the antenna beyond the basal constriction of the first segment. Eyes not large, and head relatively broad and short, as is shown by the following measurements:<sup>1</sup> Diameter of head through eyes 23, distance between inner eye margins, 14; length of head on medial line, 16; extreme width of clypeus in front of incisure, 11.5; antennal club, 7.7; dorso-ventral diameter of eye, 8.2.

Pronotum convex, widest through the posterior angles which are bluntly rectangular, and arcuately narrowed to the acute anterior angles; puncturation similar to that of front, but becoming somewhat closer toward the sides. The pronotal measurements are as follows: Width through posterior angles, 37; width through anterior angles, 23.5; length on median line, 21. Scutellum closely punctured like pronotum, but often a little less densely so on the median line; though apparently longer than wide, the actual measurements are: Base, 15; length, 15.

Elytra normally furrowed, the grooves very closely punctured with three rather confused rows of laterally coalescing punctures; costæ with a few irregularly placed punctures. Length of elytra, 70; greatest width, 45-50. Body beneath coarsely, not closely punctured, the punctures finer on the abdomen, where they tend to develop into longitudinal wrinkles. Middle of fifth abdom-

<sup>1</sup> The unit of measurement used is one tenth of a millimeter; measurements obtained by the translation of micrometer readings. (Use only actual measurements, because the impressions of comparative dimensions are usually inaccurate, often astonishingly so.)

inal sternite more or less longitudinally excavated. All of the abdominal sternites with a single, submarginal row of inconspicuous setæ. Median impressed line of metasternum with a closely approximated, and posteriorly slightly diverging line of small confluent punctures on each side, laterad of these lines a row of setigerous punctures.

The genital armature of the male (Pl. VI) measures 2.7 mm. in length and shows a more than common degree of asymmetry, which often extends down the stalk to the base of the dorsal prominence. No variations of consequence have been noted in the armatures of the numerous specimens examined. The genital plates of the females of all of the species seem to be very simple and undifferentiated, and are therefore not figured at the present time.

♀. Differs from the male only in the usual secondary sexual characters: slightly shorter antennal club, more convex underline of abdomen, less convex pygidium and much less emarginate sixth ventral plate.

Type: ♂. Lincoln, Nebraska, May 6, 1918 (L. Bruner).

Allotypes: ♀. Lincoln, Nebraska, June 5, 1918 (L. Bruner).

Paratypes: 51 ♂, 37 ♀:

Nebraska: Lincoln 35 ♂, 18 ♀; Fairmont 1 ♂, 1 ♀; Hooper 1 ♂; Brock 1 ♂.

Iowa: Iowa City 1 ♂.

Illinois: Nashville 1 ♂, 1 ♀.

Indiana: Lafayette 9 ♂, 17 ♀; Marin Co. 1 ♂.

Louisiana: Vowell's Mill 1 ♂.

This species is very similar in general appearance to *S. intermixta* Blatchley, in fact is separable only by very careful comparison of specimens, unless the determinations are made by examining the male genitalia which differ widely in the two species, the claspers of the armature being nearly symmetrical in *intermixta*. The principal differential, external characters of *campestris* are its darker color, distinctly less heavily punctured elytra and shorter antennal club, than in *intermixta*.

***Serica cucullata*** new species.

♂. Length, 10 mm.; width, 5.5 mm. Color chestnut-brown, upper surface bare, polished and shining, without any trace of sericeous or pruinose lusters; the only trace of a pruinose luster observable on the entire body being on the anterior coxæ, inferior portion of anterior femora and terminal segment of the abdomen.

Clypeus distinctly impressed, with elevated margins, the anterior margin more strongly so, slightly reflexed and moderately sinuate at the middle; the lateral incisure relatively deep, wide and obtuse at the bottom; discal area very distinctly tumid slightly below the middle; puncturation moderately

strong, uniform and rather dense, the punctures separated by one half to two thirds of their own diameters. Front much less densely punctured; the punctures irregularly placed, contiguous to separated by three or four times their own diameters. Occipital area nearly impunctate. Antennal club rather long, about equal to the total length of the antenna. The eyes are relatively large, and the head narrow anteriorly, as is shown by the following measurements: Diameter of head through eyes, 28; distance between inner eye margins, 16; length of head on median line, 20.5; extreme width of clypeus in front of incisure, 13; antennal club, 11.3; dorso-ventral diameter of eye, 11.

Pronotum transverse and only moderately convex; sides but little convergent through the posterior two thirds of their length, then rather suddenly rounded inwardly to the anterior angles; puncturation similar to that of the front, becoming somewhat closer toward the sides. The pronotal measurements are as follows: Width through the posterior angles, 44; width through the anterior angles, 29; length on median line, 24.5. Scutellum closely punctured at the sides, nearly impunctate through the center and at the apex; though apparently longer than wide, the actual measurements are: Base, 11; length, 12.

Elytra strongly furrowed, the sulci densely and coarsely punctured, with the punctures arranged in three irregular rows which show a tendency to become laterally confluent. Elytral costæ well rounded and with a few large scattered punctures. Length of elytra, 81; greatest width, 55-60. Body beneath coarsely, not closely punctured, the punctures finer on the abdomen. Fourth sternite often more or less impressed at the middle, sometimes showing a fine, longitudinal line through the vaguely defined impression. The single, submarginal rows of setæ seen on the sternites of most of the species are here nearly or quite wanting, although rows of slightly coarser punctures are traceable. Metasternum similar to that of the preceding species.

The genital armature of this species is unusually large, measuring 3.4 mm. in length. Its general characteristics are sufficiently indicated by the figures on Plate VII, but attention should be drawn to the nature and extent of the variations observed. The sides of the stalk are often much less convergent toward the tip than is shown in the figure, in a few examples nearly parallel, also the recurved rims of the claspers are often much less angulate, in fact the angulation nearly or quite disappears in a few specimens. A single specimen is at hand from Clayton, Georgia, with the stalk much shortened.

♀. Differs from the male only in the usual secondary characters mentioned in the preceding description.

Type: ♂. Montreal, Quebec, May 6, 1905 (A. F. Winn).

Allotype: ♀. Black Mountains, North Carolina, August 26, 1912 (Wm. Beutenmüller).

Paratypes: 29 ♂, 2 ♀:

Canada: Montreal, Quebec 1 ♂; Ottawa, Ontario 1 ♂; St.

Therese Island, Quebec 1 ♂; Winnipeg, Manitoba 1 ♂;

Aweme, Manitoba 1 ♂; Kentville, Nova Scotia 1 ♂; British Columbia 1 ♀.

Wisconsin: Trout Lake 1 ♂.

Michigan: Lake Superior 1 ♂.

Maine: Paris 1 ♂.

New Hampshire: Three Mile Island 1 ♂.

New York: Ithaca 6 ♂, 2 ♀; McLean Bogs, Thompsons Co. 2 ♂; Saranac Lake 1 ♂; Lynds 1 ♂.

Connecticut: Cornwall 1 ♂; Colebrook 1 ♂.

Washington, D. C.: 1 ♂.

North Carolina: 1 ♂; Black Mountains 3 ♂.

Georgia: Clayton 1 ♂.

This species is easily distinguished from the preceding by its larger size, paler color, more strongly furrowed elytra and much stronger clypeal notch. However, its separation from some of the other related species is a matter of some difficulty unless the genital armature is examined.

***Serica elusa* new species.**

♂. Length, 10 mm.; width, 5.5 mm. Color chestnut-brown; upper surface bare, polished and shining; the only trace of a pruinose luster observable on the entire body being on the anterior coxæ, inferior portion of anterior femora, sixth sternite and margins of pygidium.

Clypeus but very slightly impressed, with elevated margins, the anterior more strongly so, very slightly reflexed, and moderately sinuate at the middle; the lateral incisure acute, varying in depth from one-half to the entire width of the elevated margin; discal area very distinctly tumid at the middle of the lower half; puncturation rather strong, finer and denser on the tumidity, coarser and sparser above it, with the punctures rarely attaining the clypeal suture; the narrow, irregular, impunctate area thus formed rather emphasizing the already well defined suture. Clypeus and sides of front with a few stiff, erect, golden-brown hairs. Front a little less densely and regularly punctured than the upper portion of the clypeus, the punctures contiguous to separated by three times their own diameters. Occipital area nearly impunctate. Antennal club rather long, about equalling the total length of the antenna. Eyes moderate in size. Measurements of head as follows: Diameter of head through eyes, 26.5; distance between inner eye margins, 16; length of head on median line, 18; extreme width of clypeus in front of incisure, 12; antennal club, 10.5. Dorsal-ventral diameter of eye, 10.

Pronotum nearly twice as wide as long, moderately convex, sides but little convergent through the posterior three-fifths of their length, then broadly rounded to the anterior angles; rather coarsely punctured, more

sparsely so on the disk where the punctures are separated by one to three or four times their own diameters, and more closely so toward the sides where the average distance between the punctures about equals their own diameters; an oblique, shallow impression before the basal angles. The pronotal measurements are as follows: Width through the posterior angles, 43; width through the anterior angles, 28; length on the median line, 22. Scutellum coarsely punctured, the punctures crowded to the sides, leaving the median line and apex impunctate; length, 10; width, 10.

Elytra strongly furrowed, almost exactly as in *S. cucullata*, with the usual coarse, dense puncturation of the sulci, the punctures showing a tendency to coalesce laterally and to be arranged in three to four confused rows in each sulcus; costae rounded, bearing only an occasional puncture. Length of elytra, 74; greatest width, 55.

Posterior coxal plates coarsely and closely punctured; remainder of ventral surface with punctures finer and somewhat less densely placed. Fourth sternite often more or less impressed at the middle, sometimes showing a fine longitudinal line through the vaguely defined impression. Sternites without the usual rows of semi-erect setae. Median impressed line of metasternum with a closely approximated and posteriorly slightly divergent line of small, confluent punctures on each side, laterad of these lines a row of setigerous punctures.

Length of genital armature of male, 3 mm. (Pl. VIII); armature with an unusually heavy stalk in proportion to the diminutive claspers.

♀. Antennal club measuring 8 instead of 10.5, as in the male; under line of abdomen evenly convex; and sixth sternite less emarginate at the middle of its apical margin than in the male.

Type: ♂. Ithaca, New York, April 14, 1915.

Allotype: ♀. Ithaca, New York, May 5, 1915.

Paratypes: 5 ♂.

New York, Ithaca 2 ♂.

New Hampshire, Three Mile Island 3 ♂.

*Elusa* differs from *S. cucullata* by having the clypeus somewhat more polished, and distinctly more sparsely punctured especially along the suture; by the less depressed discal area with the tumidity more limited behind and its crest more anterior in position, and the clypeal incisure less pronounced and distinctly more acute at the bottom. The pronotum of *elusa* is slightly more convex, with the sides less parallel behind and less suddenly and strongly convergent in front. Altogether the resemblances of the two species are so remarkable, and the differences so much more like individual variation than specific characters, that one would ordinarily refuse to accept *elusa* as a valid species

were it not for the striking and indisputable evidence furnished by the structure of the genital armatures of the males of the two species.

***Serica ochrosoma* new species.**

♂. Length, 7.5 mm.; width, 3.75 mm. Color dull yellowish brown, much resembling that of *Cyclocephala immaculata*; upper surface bare, polished and shining; beneath shining, except for a slight pruinose lustre on anterior coxae and lower portion of anterior femora and a slight opacity of the abdominal sternites; especially the last one.

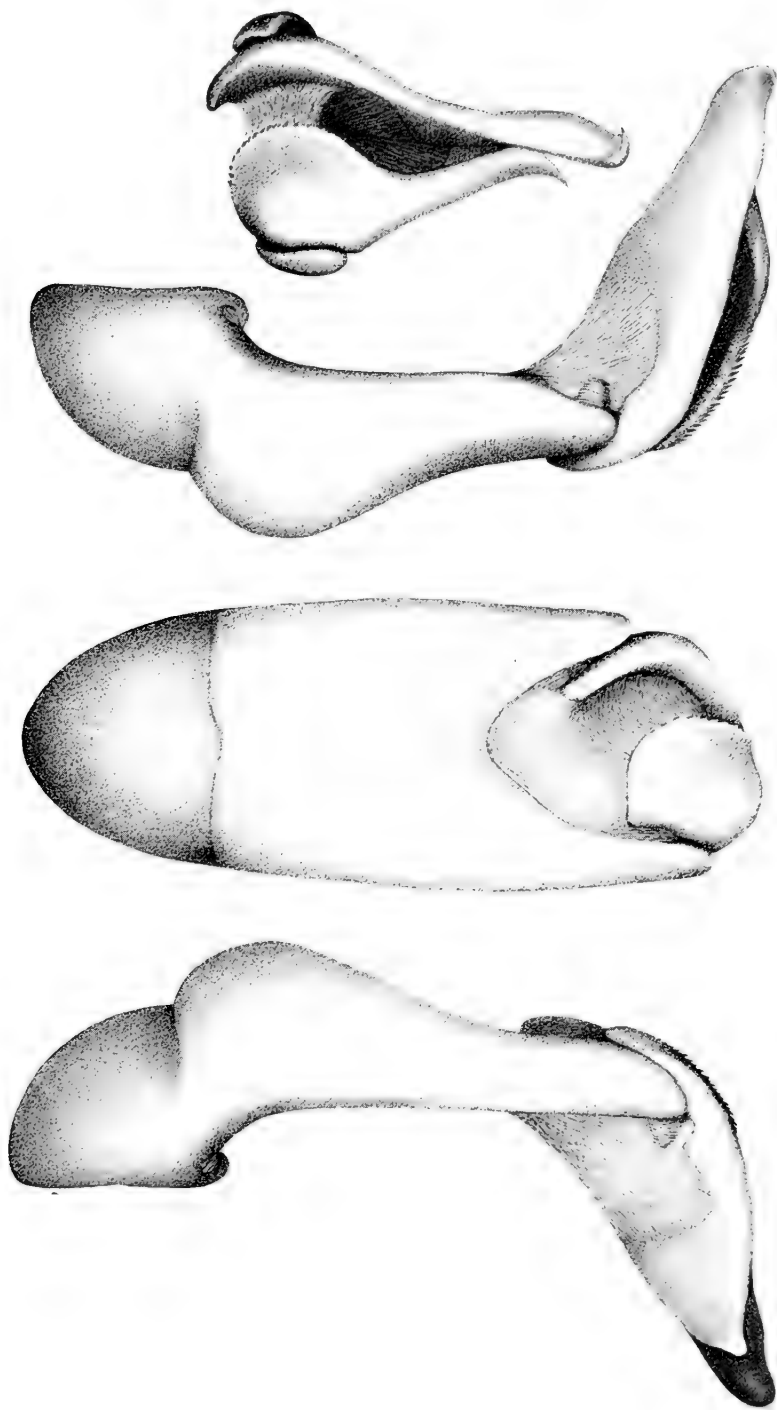
Clypeus neither depressed nor elevated, but exactly continuous with the smooth, even convexity of the front; anterior margin suddenly and rather strongly reflexed; reflexed tip, viewed from in front, strongly and evenly arcuate; lateral margins of clypeus elevated to about half the extent of the anterior elevation; lateral incisure deep, obtuse and conspicuous, entirely dividing the elevated margin; punctures moderately fine, except for a few coarse ones just before the anterior reflexed margin, closely and evenly placed, separated by about their own diameters, or a little less, and interspersed with a microscopic, secondary puncturation; clypeal suture very fine, and inconspicuous, though easily traceable. Front with the same double puncturation as the clypeus, but the coarser punctures separated by one to three times their own diameters. Antennal club rather long, about equaling the total length of the antenna. Eyes rather large. Measurements of head as follows: Diameter of head through eyes, 20; distance between inner eye margins, 12.3; length of head on median line, 15; extreme width of clypeus in front of incisure, 9; antennal club, 8; dorso-ventral diameter of eye, 7.6.

Pronotum one and two-thirds times as wide as long, rather strongly convex, sides but little convergent through the posterior two-thirds of their length, then sloping more abruptly to the anterior angles, very uniformly and rather closely punctate; posterior angles of pronotum often showing traces of an oblique impression, and in front of this, about three-fifths of the way to the anterior margin of the pronotum, a slightly impressed spot showing a persistent tendency to be clouded with dark brown. The pronotal measurements are as follows: Width through the posterior angles, 30; width through the anterior angles, 20; length on the median line, 19. Scutellum less shining than the pronotum and elytra, with the punctures crowded to the sides; length, 8; width, 8.

Elytra rather strongly striated, the striae clearly defined or line-like, and the interspaces of uniform width and quite evenly convex; punctures fine and discrete, rather evenly distributed and showing but little if any tendency to be arranged in lines; surface of elytra with a barely discernible sericeous luster and microscopic secondary puncturation. Length of elytra, 55; greatest width, 38.

Metasternum and posterior coxal plates, especially the latter, shining, coarsely and closely punctate and microscopically alutaceous. Second, third,





*Serica campestris* Dawson.





*Serica cucullata* Dawson.





*Serica elusa* Dawson.





*Serica ochrosoma* Dawson.





fourth and fifth sternites each with a conspicuous row of closely set, stiff, brown bristles, near the middle of the segment at the sides and approaching the posterior margin medially where the bristles become shorter and less regularly placed.

Length of male genital armature, 2 mm.; armature strongly asymmetrical as shown one Plate IX.

♀. Differs from the male by having a less strongly developed clypeal notch, smaller eyes, a shorter antennal club (5.3 instead of 8 as in the male), and a more convex under line of the abdomen.

Type: ♂. Halsey, Nebraska, June 1, 1912 (J. T. Zimmer).

Allotype: ♀. Holt County, Nebraska.

Paratypes: 6 ♂, 1 ♀.

Nebraska, Halsey 4 ♂; Holt County 2 ♂.

Kansas, Mendota 1 ♀.

*Ochrosoma* is one of the more easily recognizable species of *Serica* because of its unusually pallid color, shining surface, deep and obtuse clypeal incisure, strongly reflexed anterior margin of clypeus, conspicuous abdominal bristles and distinctive structure of the male genital armature.

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## INSECTS OF THE SWAMP ROSE-MALLOW, HIBISCUS MOSCHEUTOS L., IN NEW JERSEY.

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In 1907 when the writers were observing the buprestid beetle *Rhabdoscelis tenuis* Lec., on the swamp rose-mallow (*Hibiscus moscheutos*) growing in a nursery, they noted other insects infesting this plant and it appeared to them that observations on these insects might prove interesting. Accordingly, a study of the insects associated with this plant was undertaken. Some of the observations were made in 1917, but the major portion during the season of 1918. The results are given in this paper and it might be added that they were carried on incidental to other work and were made on plants in some of the nurseries as well as those growing on the marshes in their natural environment.

The plants and the insects associated with them were observed at several places in New Jersey, but the principal observations were made at Arlington and in a nursery at Rutherford. It must be understood that the dates given apply to the latitude of New Jersey and would probably be somewhat different for the same species at points further south.

The swamp rose-mallow is a perennial herb growing from three to six feet or more in height and forming a number of erect, cane-like stems at the summits of which are borne the conspicuous flowers on stout pedicels. The flowers vary from four to seven inches across, are white or pink, sometimes with a crimson center and form a conspicuous feature of the marsh inhabited by these plants when in bloom from late July to early September. "Only one style of flower occurs on any given plant, but the plants are usually mixed together indiscriminately and show besides differently colored flowers, considerable difference in the shape of the leaves, pods and calyx lobes. Dr. N. L. Britton has described as distinct *H. oculiroseus* (cf. Jour. N. Y. Bot. Gar., IV, 220, 1903) from a plant of the crimson eye, cultivated and introduced into the nursery trade by Mr. William Bassett of Hammonton, N. J., from an original plant obtained at Absecon, N. J. The wild plants now growing there, however, are normal *H. moscheutos* and I regard Dr. Britton's species as a sport due to cultivation" (Witmer Stone, Plants of Southern New Jersey, N. J. State Mus. Rept., 1911).

The conspicuous flower is followed by a fruit in the form of a 5-valved, green capsule almost an inch in diameter, ovoid and more or less acuminate at apex. This contains a number of round or reniform brown seeds, which fall or are shaken out after the capsule splits open in October. The swamp rose-mallow occurs along the Atlantic Seaboard from Massachusetts to Florida chiefly in the brackish marshes, but also to some extent in marshes bordering fresh water ponds and streams. In New Jersey this species is found in numerous places along the coast and Delaware River. It occurs at several inland points as well, such as Lawrence Station (Mercer County) and Rahway (Union County), while the most northern points recorded are near Closter (Bergen County) and Hopewell (Hunterdon County). Frequently it is found growing among cat-tails. An interesting feature of this plant is that while its natural

habitat is the swamp or marsh it appears to thrive just as well in the normal soil found in the nurseries where it has been noted to vary considerably, in some instances producing flowers of a very large size.

*Rhæboscelis tenuis* Lec.

*Rhæboscelis tenuis* Lec., was described by Le Conte in 1863 in the Smithsonian Miscellaneous Contributions, from specimens collected by Mr. Ulke in Maryland and by Mr. Benj. D. Walsh in Illinois. Since then it has been recorded in very few local lists and so far as we are aware there has been very little or no indication of its habits or food plant. In Ulke's Washington list it is recorded as being taken on oak, but a more nearly accurate suggestion is made in Smith's List of the Insects of New Jersey (1909), where Mr. Wenzel records it from Anglesea in July on low plants in swampy glades.

Our attention was first attracted to this insect early in the summer of 1917 when it was observed in the Bobbink and Atkins nursery at Rutherford feeding on the leaves of the swamp rose-mallow. It was apparent that this was the food plant of the adult and perhaps that of the larva as well and further investigations later in the season proved this surmise to be correct.

The adults make their appearance about the middle of May and continue in evidence until the latter part of July. By early August they have disappeared. The eggs of this species have not been observed, but it is evident from a study of the larval burrows that the eggs are deposited in the upper part of the stems or even in the leaf petioles, probably inserted into the bark tissue. From each egg there develops an agrilid-like larva save perhaps that it is somewhat more elongate as will be noted in the description which follows. This larva burrows down the stem into the pith or between the pith and wood, making a characteristic winding or zig-zag gallery. In some cases it appeared that the larvæ retraced and burrowed up the stem again as pupal chambers in some cases were found pretty well up the stem, too high for the larva to have reached the point by simply burrowing downward and not enough distance having been covered for the larva to have reached its full development.

There is no external evidence on the stem to show the presence of the larva within, but where burrowing occurs in the leaf petiole

as was the case with some found early in the summer of 1917, the petioles either become shrivelled or decidedly swollen and cracked. In these cases the eggs had evidently been deposited at the base of the leaf blade. In 1917, on August 1, larvæ were found in leaf petioles, so that apparently only a few days previous to this had they hatched from the eggs and it seems probable that larval development begins in July. From this date on they may be found at various times during the season. By the approach of cold weather in the fall larval development is completed and the larva assumes a characteristic position in a pupal chamber. These larval cells or pupal chambers may be located either in the pith or woody portion of the stem, but not at the surface and usually at an angle. They have been found at the base of the stem, even slightly below the ground surface, but never at the tips.

In these burrows the larva hibernates with the body doubled over on itself, the folding taking place between the third and fourth abdominal segments, sometimes with the head pointing upward and sometimes in the reverse position. This condition continues until the following April or even early May, as pupæ were found in stems this year (1918) when examined on May 25.

The pupal stage apparently is of about two weeks' duration. Infested stems examined on April 22 were found to contain larvæ, and from these adults emerged May 8. In emerging it is evident that the beetles eat their way out from the pupal chamber. The adults frequent the upper surface of the leaves of the food plant and in the nursery at Rutherford, where most of the observations were made, many were noted in that location at various times during the season, both in copulation and feeding. They feed on the younger leaves, making holes from one sixteenth to one eighth of an inch in diameter. These holes apparently become intensified as the leaves enlarge, and on a badly infested plant many leaves may be injured in this way. The attitude of the beetles varies with weather conditions. When the sky is overcast they may be readily picked from the leaves, but on a bright day when capture is attempted, they release their hold and drop, usually catching on one of the lower leaves or spreading their wings in attempted flight.

The descriptions of the various stages are as follows:

*Egg*.—Not observed.

*Larva*.—Length 12 to 13 mm. Width of thorax 1.1 mm. Long, narrow, cylindrical, white or slightly yellowish except head; composed of 13 segments. Head triangular, obtusely rounded anteriorly somewhat retracted into first segment; ventral surface dark brown, dorsal surface lighter, becoming more so posteriorly. Thoracic segments subequal, sides strongly arcuate; anterior margin of first thoracic segment protruding so as to cover most of head. Fine, dark, impressed, median line on dorsal and ventral surfaces of first thoracic segments beginning at posterior margin and extending anteriorly beyond the middle of the segment. Abdomen subcylindrical, slightly flattened dorso-ventrally, sides of segments subparallel, slightly arcuate, impressed at joints. First abdominal segment subquadrate, remaining ones slightly increasing in length toward posterior end. Ultimate segment triangular, distal end obtusely rounded and slightly dark at margins. Stigmata on second thoracic and abdominal segments one to eight.

*Pupa*.—Length 6.5 mm. (Pupal cell, length 7–8 mm., width 1–1.6 mm.) Long, cylindrical, broadest at thorax. Head narrower than thorax and slightly bent ventrally. Antennæ extending posteriorly to middle of first thoracic segment. Sides of thorax and anterior portion of abdomen subparallel. Posterior half of abdomen gradually tapering to tip. Posterior abdominal joints slightly ridged. Wing pads extending to middle of abdomen.

*Adult*.—*Rhæboscelis tenuis*. The following is the original description by Le Conte (New Species of N. Amer. Col., 1863, part I, p. 82, Smithsonian Misc. Contrib.): "Valde elongata, nigro-aenea, griseo-tincta, capite convexo, haud dense punctata, profunde canaliculato, thorace latitudine paulo brevior, antice sublatis et lateribus ibi rotundatis, haud dense rugose punctato versus latera oblique excavata, angulis posticis rectis planis, elytris rugose punctata, apice singulatim rotundatis haud serrulatis; unguiculis appendiculatis. Long 20." Le Conte states that it closely resembles *Agrilus cegenus* or any other of our smaller species, but is known at once by the antennæ being scarcely longer than the head and received in well defined but short grooves excavated in the inflexed portions of the prothorax just beneath the lateral margin.

As has been stated, the rose mallow is confined largely to the Atlantic seaboard and it is evident therefore that if this is the only

food plant of this species, it would follow the same distribution. In regard to this matter, Mr. Leng on inquiry has written as follows: "*Rhabdoscelis tenuis* is recorded from New Jersey, District of Columbia and Florida. A closely allied species has been described by Schaeffer (Jour. N. Y. Ent. Soc., XII, p. 211) from Texas. It is not mentioned in Blanchard's New England List nor in Hamilton's Pennsylvania List nor in the Michigan List nor is it mentioned by Blatchley, so that its distribution so far as I know seems to be restricted to the more southerly Atlantic States and possibly the Gulf States. In Ulke's list it is said to have been taken on oak, but the reference given in Smith's List shows that it occurs from May to September on low plants in swampy places."

The latter date is a record from Lakehurst and seems rather difficult to account for, as it hardly seems possible that the life history would be so very different at Lakehurst from what it is at Rutherford where the adults apparently disappeared by mid-summer. The local records of distribution are as follows: Rutherford (nursery); Arlington (meadows); Springfield (nursery); Palmyra (river marsh); Lawrence Station (pond shore); Westville (river marsh); Gibbstown; Greenwood Lake, v, 17 (Joutell); Lakehurst, v, vi, ix (Joutell); Gloucester, vii, I (Boerner); Five Mile Beach, April 4 (Wenzel); Burlington Co., June 4 (G. M. Greene); NEW JERSEY. Dyker Meadows, L. I., vii, 6 (Shoemaker); Belleport, L. I., vi, 27 (Nicolay); NEW YORK. Angora, June 15 (G. M. Greene); PENNSYLVANIA. Chesapeake Beach, vi (Shoemaker); MARYLAND.

In the nurseries where the last season's dry stalks are allowed to remain on the plants, the beetles emerging from these infest the present season's growth. Moreover, it is apparent that if these old stalks are cut and burned, the infestation will be largely eliminated. If this is done the stalks should be cut at the surface of the ground. The importance of this was shown in a nursery where the stalks had been removed in the early spring, but several inches at the base had been left standing, and in these mature larvæ and pupæ were found. It is also evident that the injury to the leaves by the adults could be controlled by spraying with arsenate of lead.

**Conotrachelus fissunguis** Lec.

The description of this species by LeConte appeared in 1876 in the Proc. Am. Phil. Soc., XV. Blatchley and Leng in their "Rhyn-

chophora or Weevils of N. E. America" state that it ranges from New Jersey and the District of Columbia to Louisiana, breeding in the seed pods of the swamp rose-mallow (*Hibiscus moscheutos* L.), occurring in New Jersey from July to October. Smith in his "Insects of New Jersey" (N. J. State Mus. Rept., 1909) says that it is found along the river front near Camden and everywhere along shore in mallow swamps.

The beetles appear in July and by the last week in August, most of the eggs have been laid and only a few adults are to be found. At Westville, N. J., on August 23, only several adults were taken in the flowers while feeding on the bases of the petals and these were evidently stragglers. At this date egg-laying was practically over, as a dissection of the seed capsules showed a few unhatched eggs, many small-sized larvæ and a few full-grown ones.

The egg punctures consist of irregular circular openings through the seed capsule wall, each being about 1 mm. in diameter. They are readily identified by the blackish color around the edges of the openings. The whitish eggs are found resting against the inside wall of the seed capsule, near the puncture or between the developing seeds near the puncture. Some seed capsules contained as many as eighteen punctures, while others had as few as two or three.

Upon hatching the young larva goes in a developing seed to feed and hollows it out, leaving only the outer shell, which soon decays and turns black. This operation continues until the larva is too large to enter a seed and then the seeds are consumed from the outside. When full grown the larva leaves the seed capsule either by cutting a circular hole in it or by simply crawling out if the capsule has split open as it naturally does.

It then drops to the ground and works its way beneath the surface to a depth of one half to one inch, where it constructs a little cell in which to pupate. In the laboratory larvæ under our observation entered the soil on August 27 and became pupæ on September 2. On September 17 the pupæ turned brownish and on the 18th they had transformed to beetles, showing that sixteen days were required for pupation. After the pupal skin is shed the adults are whitish and without distinct marks. They remain in the cell several days until the colors are fully developed. On September 22 and for several days later they emerged from the soil.

The adults collected in the field during the latter part of September and October are probably members of a new brood which later go into hibernation. In the field we found infested seed capsules only on those plants growing along the edges of the marsh. None was observed on plants growing on the marsh. The reason for this is evident when one considers that pupation would not take place successfully in almost constantly wet ground.

*Egg*.—Length 1 mm. Width 0.38 mm. Oval, color white with very slight tinge, chorion smooth.

*Full Grown Larva*.—Length 8.5 mm. Width of head 1.1 mm. Normal curculio-form type, resting in characteristic curved position. Color yellowish white; skin smooth, transversely wrinkled; apodous; largest at central portion and tapering slightly toward head and somewhat more so toward oval end where it is obtusely rounded. Head yellowish white in young and partly grown larva and reddish brown in mature larva with mandibles and adjacent sutures darker. Dorsal surface of first thoracic segment reddish brown divided by a median light line. Each segment bears a transverse row of eight fine hairs consisting of four subventral and four subdorsal ones. Double row of hairs on first thoracic segment and several hairs on head. Spiracles on all segments except second and third thoracic and last abdominal.

*Pupa*.—Length 5.5 mm. Width 4.4 mm. Similar in color to larva. Dorsal surface well supplied with spines, fewer on ventral surface.

*Adult*.—*Conotrachelus fissunguis* Lec. (from Blatchley & Leng). "Broadly oval, robust, convex. Dark brown; elytra in great part densely clothed with short yellow pubescence, darker near apex, a short denuded blackish band crossing the suture about the middle; femora annulated with yellow pubescence; antennæ, tibiæ and tarsi paler. Thorax as long as wide, sides slightly rounded, feebly constricted near apex; disc very coarsely and deeply punctured and with longitudinal ridges near the tip, the middle one more distant. Elytra at base one half wider than thorax, sides parallel, then obliquely narrowed to apex; disc with rows of large distant punctures; intervals wide, flat. Abdomen coarsely punctured. Length 5-5.5 mm."

In addition to the distribution mentioned above, specimens in collection at the New Jersey Agricultural Experiment Station show that



the species occurs at Mt. Airy, Pa., and in New Jersey at Woodbury VII and VIII; Anglesea VIII, IX and South Camden. Up to the present, we have found this insect only on plants in the South Jersey marshes and not in the nurseries. Consequently no control methods need be considered. Once in a nursery, however, considerable damage could be done by this species if the plants were being grown for seed purposes as each capsule contains approximately 100 seeds and three or four larvæ will destroy nearly all of them.

It was noted that the adults of *Conotrachelus fissunguis* made a slight wheezing sound. This was quite audible when five or six were placed together. It was also observed that the noise accompanied vertical movements of the tip of the abdomen. An examination of the beetle showed that the dorsal surface of the end of the abdomen was covered with a chitinous plate which was supplied with numerous closed-fan-shaped spines. An examination of the ventral surface of the wing covers showed a somewhat horizontal series of short ridges near and somewhat parallel to outer posterior edges. Inasmuch as our supply of living specimens was limited and as they died before we could complete our observations we are not entirely convinced that these structures are responsible for the sounds produced.

#### ***Apion hibisci* Fall.**

Numerous galls of this species were first noted at Arlington, N. J., on plants growing at the edge of a drained marsh and later at Rutherford on nursery plants. Specimens of the beetles were recently sent to Prof. H. C. Fall who stated that it was a new species and kindly described it as *Apion hibisci*, so that it could be properly referred to in this paper.

The adults appear during the last week of August and the first two weeks of September. They evidently go into hibernation quarters soon after emergence because none could be found in the vicinity of the empty galls. They reappear during the following spring and deposit eggs in the bases of the leaf petioles. By the first week in July the galls are quite prominent and during the first two weeks in August pupation takes place, the adults appearing as previously stated.

Normally, the gall consists of a somewhat globular swelling of the base of the leaf petiole, but the galls are not at all uniform. In

many cases the swollen parts include in addition to the gall proper, a portion of the surface of the stem below the petiole base and the entire petiole and even the bases of the main leaf veins. The infested parts of the plant are therefore quite irregular in outline. It was noted that the galls did not occur below one and a half or two feet from the ground, showing that the plant had made some growth before oviposition had taken place. In some cases nothing was noted in the galls, although this could not be due to the fact that oviposition had been too recent. In most cases each gall inhabited contained one larva, but two were not infrequent. In rare cases three were found. Where two larvæ occurred, it appeared from the injury that oviposition had taken place on both sides of the petiole. In other cases, where only a single larva was found, it seemed as if development had not taken place in the unoccupied side of the gall.

It was observed that the first adults emerged from galls nearest the ground, that further up the stem, including the middle portion, the galls contained pupæ, and as the tip was approached, larvæ were found. From this it would appear that the first eggs were deposited in the lower leaf petioles. It might also be noted that there were sometimes two groupings of galls, several near together, then no galls for a short distance, then more further up the stem.

The globular portion of the gall, which is at the base of the petiole, contains the larvæ and it appears that they bore in the thickened bark tissue. In a few instances they continue down the stem of the plant or out into the leaf petiole, but such injuries are infrequent. The number of galls on a single plant varied from one to fifteen, the average being about eight or ten. The number of blank galls on a stem varied from three to twelve.

*Egg*.—0.35 mm. in diameter, globular, translucent.

*Full Grown Larva*.—Length 3 to 3.7 mm. Width of head 0.4 mm. Characteristic curculio-form resting in normal curved position, slightly flattened laterally, skin transversely wrinkled. Apodous. Color yellowish white. Entire surface pilose. Body broadest through middle abdominal segments tapering rather abruptly at anal end. Anal extremity obtusely pointed. Thoracic portion tapering slightly toward anterior end. Outer ventral portions of thoracic segments distinctly rounded. Head smaller than thoracic segments and slightly darker than body. Decided constriction between head and thorax.

*Pupa*.—Length 2.6 to 3 mm. Color light yellowish white. Shape broadly elliptical, tapering to oval end which is obtusely pointed and which bears a pair of spines each terminated by a pair of minute, recurved hooks. Head reflexed, snout extending to middle portion of body and bearing at middle a pair of minute hairs (one on either side). On front margin of prothorax are a pair of minute tuberculate spines, on either side of the middle of the pronotum, a tuberculate spine posterior to each of the above pairs and a pair of minute tuberculate spines on either side of the middle along the posterior margin. A single, dorsal, tuberculate spine on mesonotum. Dorsal abdominal surface more or less tuberculate, bearing minute short spines. A single, tuberculate spine occurs near distal end of femur of middle and hind leg.

*Adult*.—*Apion hibisci*. The description by Fall appeared in a recent number of this JOURNAL (Vol. XXVI, p. 219) in his paper on "New North American Species of Apion," and need not be repeated here. According to Prof. Fall, *hibisci* belongs to Section IV of his Synopsis (Trans. Am. Ent. Soc., 1898), and would by the table fall near *attenuatum*, after which it may best be placed; differing by its stouter form, broader thorax, more parallel elytra, more basally inserted antennæ, and paler tibiæ and tarsi. The sexual differences are very feeble, consisting only in the slightly longer beak in the female.

The presence of numerous galls on a plant resulting in the petioles being swollen and the stem deformed and misshapen disfigures it greatly and interferes with a normal growth although no dead plants were observed as a result of such infestation. Infested plants had normal foliage and appeared to flower as well as those which were not infested. Should this insect prove injurious in a nursery or garden, cutting and burning infested stems before the beetles emerge is suggested as a method of control.

#### ***Bruchus hibisci* Oliv.**

This species was described by Olivier in 1795 (Ent., IV). According to Blatchley (Coleoptera of Indiana) it is common in the southern two thirds of Indiana occurring from April 13 to November 1, breeding in the seeds of rose-mallow and during the spring and summer frequenting the flowers of red-bud, dogwood, red haw, etc.

All of the records in Smith's List are from the southern part of New Jersey and the dates of captures indicate that it can be found from May to September. Mr. W. T. Davis writes that he has specimens from Staten Island dated September 3 and Mr. Frost a specimen from Lexington, Texas, dated July.

From the middle of August until the middle of September we found beetles inhabiting the flowers of hibiscus in nurseries and marshes in South Jersey, feeding on the pollen. Very often they were found between the calyx and corolla and when disturbed many of them would enter this place for the purpose of concealment.

Eggs were noted during the last of August and the first week or two in September. These are laid on their sides on the outside of the green seed capsule, usually in irregularities or depressions on the surface. Some were found in the depressions running from the base to the apex of the seed capsule, which marked off the capsule chambers, while others rested close to the base of the seed capsule near the calyx.

After hatching, the young larvæ appear to enter the seed capsule at its base close to the calyx. Some bore through the calyx near the base of the capsule for a short distance before entering the capsule. Several larvæ were found in such situations on August 28, while others were noted inside the capsule near the base. Once inside they enter the developing seed and complete their larval existence. Pupa-tion also takes place in the seeds, which appear to ripen the same as uninfested ones, no evidences of infestation being visible externally.

The beetles begin to emerge during the latter part of September and continue throughout October in the southern part of the State. By the time the beetles have developed the capsules have opened, exposing the seeds, so that the insects do not have to bore through the capsule to escape. At one nursery in South Jersey we were informed that beetles usually emerged in November from seeds gathered during the last of October and kept in a warm storage room. Mr. W. T. Davis has obtained beetles from seeds collected during November, and Blatchley states that they emerged from October 15 to November 1 from seeds kept in vials. After emergence, they undoubtedly go into hibernation.

*Egg*.—Length 0.51 mm. Width 0.14 mm. Opaque, elliptical, broadly rounded at both ends, somewhat flattened on side, which rests

against seed capsule. A female collected August 28 and dissected showed ten developed and twenty developing eggs. The recently hatched larva is about 0.35 mm. long and the width of the head is 0.09 mm. While we had thousands of hibiscus seeds at our disposal, the infestation was so light that we were unsuccessful in locating either full-grown larvæ or pupæ. Hundreds were broken up in the attempt, but nothing resulted. No external marks of infestation were visible and infested seeds did not respond to the tests usually recommended as a means of discovering infestation.

*Adult.*—*Bruchus hibisci* Oliv. The following redescription is by Blatchley: "Broadly oval, robust. Black, moderately shining; sparsely pubescent with grayish-yellow hairs which on the elytra are frequently and irregularly interrupted by transverse bare spaces; antennæ pale reddish brown, joints 4-9 often slightly darker; front and middle legs rufous; hind femora black, red at tip. Thorax twice broader at base than long, rapidly narrowing to apex; surface sparsely punctured. Scutellum whitish, bifid at tip, median line distinct. Elytra together as broad as long, disc convex, finely striate, the striæ punctured; intervals flat, marked with fine and coarse punctures intermingled. Pygidium black, broadly oval, sparsely punctured. Length 2-2.5 mm."

*Records.*—Woodbury (Li); Westville, V-VIII (div.), VI-16 (G. M. Greene); Clementon VI; Big Timber Creek, VIII (G. M. G.); Anglesea, V, 28-IX, 20 (div.); Riverton, VIII, 12 (Weiss and Dickerson); Palmyra, VIII-12 (Weiss and Dickerson), Sept. 5 (Weiss and Dickerson); Eatontown, VIII-28 (Weiss and Dickerson); Lawrence Station, VIII, 19 (Weiss and Dickerson); Eatontown, VIII, 28 (Weiss and Dickerson); Atlantic Highlands, VIII, 15 (Weiss and Dickerson); Westville, VIII, 23 (Weiss and Dickerson); New Jersey. Staten Island, September 3 (Davis); New York. Mr. Leng writes that it is known also from the District of Columbia and Michigan. Blatchley's Indiana and Frost's Texas records have already been noted.

The entire interior of the seeds is destroyed by the larvæ and nothing but the hard outer shell remains. The beetles emerge through almost circular openings varying from 1.25 to 1.5 mm. in diameter. Up to the present, this insect has not been numerous enough on commercial establishments to make control measures necessary. At one

place it was customary to place camphor balls in with the seed after it has been collected and stored, it being believed that this prevented further infestation. We have no evidence, however, for assuming that the beetles reinfest stored seed. If they do, keeping the seeds in a cool temperature would prevent development.

***Chætocnema quadricollis* Schwarz.**

This species was first noted by us during the summer of 1916 at Arlington, N. J., where it was very abundant on the foliage of hibiscus in a nursery. Numerous specimens were recently submitted to Mr. C. W. Leng, who after an examination of them, very kindly supplied us with the following note:

"This species is described by Dr. Horn (Trans. Am. Ent. Soc., XVI, 1889, p. 267) as having the head impunctate, piceous black with faint æneous luster, antennæ entirely rufotestaceous. In the series collected at Rutherford, N. J., on rose-mallow by Weiss and Dickerson, the head like the pronotum has feebly impressed punctures, as well as the microscopic punctulation that causes the surface called alutaceous by Horn, but they are more distant and hardly apparent except at sides. Florida specimens collected by Mr. Schwarz also show a very few such punctures; and the Horn description requires modification. The color in the New Jersey specimens varies, many having not a faint but a very decided æneous luster; the last joint of the antennæ is often fuscous and the hind femora instead of being sometimes slightly darker are usually decidedly piceous externally.

"In the original description by Schwarz (Proc. Am. Phil. Soc., xvii, 1878, p. 368) the color is given as æneous above head and thorax brassy, antennæ and legs bright testaceous red, hind femora more or less infusate. The head is described as having a few scattered punctures. Dr. Horn's description, therefore, departs from the original as well as from the facts. The New Jersey specimens seem on the whole slightly different to the Florida ones, but not sufficiently so as to require a name."

Since 1916 we have found this flea beetle to be present at the following localities in New Jersey: Hammonton, July 8; Rutherford, June, July 13, Sept. 15; Eatontown, Aug. 28; Ridgefield, July 22; South Orange, Aug. 3; Westville, Aug. 23; South Amboy, Aug. 17, and Little Silver, August, occurring on plants growing on the marsh

as well as in the nurseries. Mr. H. S. Barber writes that he has found this species on hibiscus in the marshes of Chesapeake Bay and near Washington, D. C.

The beetles infest both leaf surfaces, preferably the upper, their feeding being quite characteristic and often resulting in a complete killing of the foliage. As a rule they feed in colonies of from five or less to fifteen or more individuals and are present during June, July, August and September, being most numerous during June and July.

Adults were observed in copulation on July 13 and August 28. The egg from a dissected female is elliptical, white and rounded at both ends. No measures of control have been worked out, but if necessary the use of Bordeaux mixture and arsenate of lead is suggested as a repellent.

***Gelechia hibiscella* Busck.**

This species, which was kindly identified by Mr. Carl Heinrich through the courtesy of Dr. L. O. Howard, was under our observation for the past two years. It was described by Busck in 1903 (Proc. U. S. Nat. Mus., vol. 25, p. 869) from specimens collected and reared from larvæ on hibiscus in the District of Columbia. In Smith's List (N. J. State Mus. Rept., 1909) it is recorded as rare from Anglesea. As a matter of fact, we have found it fairly plentiful in several widely separated places in New Jersey.

According to Busck, whose observations were made in the District of Columbia, the larva feeds on the leaves or in the seed capsules, generally in large numbers together. When ready to pupate they partially bite off one or more leaves which thus dry up and crumple and afford convenient shelter; or others find room in the dried fruit or between it and the large surrounding calyx. The species overwinters as larvæ and two generations are found, the adults issuing from hibernating larvæ in May and from the summer brood in August.

In New Jersey from observations conducted on plants in a nursery at Rutherford and on a marsh at Arlington, it is evident that there are two broods. Adults appear from overwintering larvæ during the first two weeks of June and deposit eggs on either the under or upper leaf surface, usually near the tip or margin. These hatch in about one week and the larvæ feed on the leaves and some-

times on the tender tissue of the stem. During the last few days of July and the first three weeks of August, adults appear and eggs are again deposited. Most of these hatch by the last of August and by the middle and last of October the larvæ are full grown and have sought hibernation quarters. In addition to feeding on the foliage the larvæ also roll the leaves from the edge toward midrib. Usually one side only was rolled, but sometimes both. In a very few cases the leaves were rolled from the tip downward toward the middle.

As a rule the method of procedure was as follows: The larva resting on the blade of the leaf would crawl out on the petiole for about one quarter of an inch from the base and bite through the petiole until the leaf hung only by a few strands of tissue. This caused the leaf to wilt gradually, making it more flexible and easier to roll. The larva then would roll the leaf from the outside, fastening it with several strands of silk. Inside these rolled leaves, which later became very dry and brittle, were found larvæ in all stages and pupæ. The curled leaves finally drop to the ground and on several occasions pupæ were found in them.

Pupation evidently takes place in the curled leaves either on the plant or on the soil. According to Busck, the cut leaf dries up and crumples, but in New Jersey, however, we found that they were rolled and fastened by the larvæ. The larvæ are very active when disturbed in their shelters and elsewhere and wriggle violently in their efforts to escape. The second brood of larvæ confine their feeding mostly to the young leaves, the stem tissue near the tip, and the base and surroundings of the seed capsule. On October 24 at Rutherford, partly developed and full-grown larvæ were observed in the dried seed capsules. Some had eaten their way into the base of the capsule inside the calyx. Some were found in the bottom of the capsule in one of the four divisions, together with partly eaten seeds. Others were found under the somewhat dried stem tissue at the tip of a shoot. In every case, the material around the larva was somewhat webbed up and it is evident that the places where they were found had been selected as hibernation quarters.

*Egg*.—Length 0.6 mm. Width 0.22 mm. Oblong, sides parallel, ends broadly rounded. Translucent, yellowish contents visible through chorion. Chorion apparently smooth.

In our cages 19 eggs were placed as follows: 4 on the upper leaf



surface near tip, 4 on the under surface near the side margin, 8 on the upper surface near tip, 1 on under surface near tip and 2 on the under surface near the base.

*Recently Hatched Larva.*—Length 2.2 mm. Width of head 0.15 mm. Uniformly white, tinged with yellow save legs, which are reddish and head which is uniformly black with mouth parts lighter. Head bears several fine long hairs. Thoracic shield brown. Each body segment bears eight fine hairs, four on dorsal surface and two on either side, two of the dorsal hairs and four of the lateral forming a transverse row. Hooks of prolegs elongate. Longitudinal lines of developing larva absent.

*Full Grown Larva.*—The following description is by Busck: "The larva is rather large when full grown in proportion to the imago, being 22–23 mm. long and with greatest width 2.2 mm. It is cylindrical, only slightly tapering fore and back. Head rounded, shorter than wide, black, with reddish brown vertex; width 1.3 mm. First thoracic segment somewhat narrower than the following joint, reddish, thoracic shield black, width 1.6 mm.; length 0.7 mm.; straight in front and nearly straight posteriorly. Second thoracic segment dark reddish, with anterior part white above. Third thoracic segment and the rest of the body white; on the posterior half of this joint begin six wavy, narrow interrupted longitudinal dark reddish dorsal lines, which run through on all the rest of the segments. These lines are darker in the young larvæ, which otherwise are like the full grown larvæ. Tubercles shining deep black, bearing short black hairs; they are arranged conspicuously on the white part between the dark lines. Ventral part of abdominal segments white. Thoracic feet black; abdominal prolegs normal, white, with a complete circlet of brownish hooks."

*Pupa.*—Length 6–7 mm. Greatest width 2 mm.

*Adult.*—*Gelechia hibiscella*. Busck's description is as follows: "Antennæ dark brown, not annulated, slightly serrate toward the tip. Labial palpi with well-developed spreading brush, yellowish white; second joint with a few black scales on the outside; terminal joint with tip and one annulation near base black.

"Face, head and thorax shining ochereous white; shoulders purplish black. Costal half of forewings dark brown, in some specimens nearly black; dorsal half including apex light ochereous brown, in

some specimens whitish. The limit between these two parts of the wing is not very definite and somewhat variable.

"In the dark costal part are found lighter, yellowish brown, irregular patches, one large indistinct at the middle of the costa, one small, rather more distinct costal spot at the beginning of the cilia and in some specimens others not well defined. In the dorsal light part of the wing are ill-defined darker shadings and the veins are indicated darker so as to produce a striate effect. On the fold at the basal one third is a small, nearly black spot which seems to be constant. Likewise is a row of black dots around the apical edge constant in all my specimens. The other markings are more or less varying.

"Hindwings a little broader than forewings, light bluish fuscous; cilia yellowish. Abdomen yellow. Legs dark purple, with yellowish white bars on the outside and with tarsal white annulations. Alar expanse 16 to 17 mm." Busck states that *hibiscella* is quite near *ochreostrigella* Chambers, but not so conspicuously streaked and with light, dark annulated third joint of labial palpi instead of the uniformly dark, nearly black terminal joint in *ochreostrigella*.

In Dyar's Catalogue (Bull. 52, U. S. N. M., 1902) the distribution of the species is given as District of Columbia. In New Jersey we have found larvæ on hibiscus at the following places: Hammonton, July 8; Gibbstown, July 2; Rutherford; Lawrence Sta., Aug. 19; Arlington, Sept. 10; in Smith's List it is recorded only from Anglesea, May 30, rare (Kf.).

So far as is known no measures of control have been worked out for this species. If it should prove troublesome in the nursery, spraying with arsenate of lead should be effective against the young larvæ before they enter the rolled leaves or feed in other concealed places. Hibernating larvæ could be destroyed by burning all dried stems, fallen leaves, etc., during the winter. At one nursery it was noted that raking up and burning the fallen leaves during the fall reduced the infestation the following spring.

Several specimens of *Idechthis gelechiæ* Ash. (identified by R. A. Cushman through the courtesy of Dr. L. O. Howard) were bred from pupæ during the latter part of July.

**Tarache (Acontia) delecta** Wlk.

*Acontia delecta* was described by Walker in 1857 (Cat. Br. Mus., pt. xii, p. 799). In 1865 Grote described the same thing under the name *metallica* (Proc. Ent. Soc. Phil., iv, 327) from New Jersey specimens. Packard in 1870 figured the larva and pupa under this name (after Abbot) (Amer. Nat., iv, p. 229). Mr. Archibald C. Weeks in 1888 under the title "Biography of *Acontia delecta* Walker (Ent. Amer., vol. 4, p. 46) gave an account of the life history of the insect, stating that he had collected "nearly full grown larvæ during the first week of September, 1884, feeding upon *Hibiscus moscheutos*." Beutenmüller in 1892 (Bull. Amer. Mus. Nat. Hist., iv, p. 68) also gives a brief description of the larva. The species has been noted in several lists and catalogues (Smith, Dyar, etc.), sometimes with and sometimes without reference to distribution or locality.

The strikingly colored, geometriform larvæ of this species first attracted our attention during the summer of 1917 feeding on the leaves of the rose-mallow in a nursery at Rutherford, N. J. No notes were made on its development, however, until the present year, 1918, when it was observed at various intervals during the season.

The insect is two-brooded and hibernates in the pupal stage. From these overwintering pupæ adults emerge in late May or early June, and as oviposition is undoubtedly of several days' duration, larval development is somewhat irregular. Larvæ, mostly of small size, were observed in the nursery at Rutherford on June 1 and from then until early in July, caterpillars of this brood were to be found. Second brood moths were first observed on July 8 at Arlington, N. J., and at that point and other places, throughout the rest of the month and in early August. Larvæ developing from eggs deposited by this brood of moths were first observed at Rutherford about the middle of July. Development, however, is irregular and oviposition continues for some time as larvæ could be found until early September, while some noted on August 27 were not more than half grown. These larvæ pupate in the fall and it is in this stage that the winter is passed.

The adult is a conspicuous moth, reminding one somewhat of a small *Euthisonotia unio* or *grata*.

Smith (Trans. Amer. Ent. Soc., vol. 27, p. 60) says: "This very handsome species is so much different from all its allies that recogni-

tion should be easy. When present in the field, the moths may be found resting on the hibiscus plants or on the grass near the plants. The first moths taken by us were obtained by sweeping the tall grass bordering the meadows near the patch of hibiscus at Arlington. They are not disturbed readily nor is the flight particularly rapid nor for any great distance, so that the insects may be readily captured. That they are not more abundant in collections must be due to the character and location of the food plant."

The eggs, as will be noted in the description, are somewhat globular. They are laid singly on the under surface of the leaves and do not appear to be strongly attached. Eggs laid in confinement between July 23 and July 25 hatched July 29, giving an egg period of five or six days, but the period evidently varies and in some cases is perhaps longer.

The larva is a striking one, being geometriform and characteristically marked, as noted in the description which follows. In the field larvæ may be seen usually on the upper and sometimes on the under surface of the leaves near the margins. Very commonly they will be found resting on the uppermost leaves often near the terminal bud. In feeding they make holes in the leaves somewhat like the beetle *Rhabdoscelis tenuis*, but larger; also, they are sometimes responsible for devouring parts of the bracts around the buds and evidently parts of the buds. The conspicuous larva rests or feeds in this exposed situation even in the bright sunshine and it would appear that it would fall easy prey to any birds although it has been suggested that it may be protected because it perhaps resembles a fallen and twisted petal. This was not apparent to the writers, however, who found also that the larvæ were parasitized heavily in one of the patches of rose-mallow at Rutherford. Messrs. Engelhardt and Doll informed us that larvæ under their observation, at one locality, acted as if they were nocturnal feeders.

The larval period is approximately a month's duration and when the larva matures it crawls to the ground and forms a parchment-like cocoon on the surface. The pupal period of the first brood requires only a few days, while that of the second brood lasts from fall until the following June.

As previously suggested the larvæ infesting the hibiscus in one of the patches at Rutherford were found to be heavily parasitized. On

June 15 several larvæ partly developed were collected in this patch and placed in jars for the purpose of rearing adults. At the time there were no signs of parasitism, but in the course of a few days it became evident and the majority of the larvæ died. The parasite spun a characteristic parchment-like cocoon, the shrivelled remains of the larva frequently being left behind it. These cocoons were cylindrical, 5.5 mm. long and 2 mm. wide. From them parasites emerged in the course of the next few days. These were determined by Mr. Gahan through the kindness of Dr. L. O. Howard as *Sagaritis dubitatus* Cress.

On subsequent visits to this patch of mallows, parasitic cocoons were noted. Occasionally they were found on the upper surface of the leaves, but usually on the lower surface and loosely attached. Due to this latter fact many of these cocoons probably fall to the ground. One thing is evident. A large number of the larvæ in this place were parasitized, although we did not observe similar conditions in other localities. However, we did not observe larvæ so abundant in any other locality, and there is no doubt that similar parasitism may occur when the larvæ become plentiful and that this parasite may be one of the natural checks of this species.

*Egg*.—Diameter of base 0.5 mm. Height 0.55 mm. Subglobular, slightly broader at base. Chorion sculptured with pronounced, acute, blade-like ridges running from base toward apex and with a number of fine transverse lines. About one-half of the twenty-four ridges extend almost to micropyle and a few unite in pairs, the other half extending about two thirds of the way up. Color light. Deposited singly on under side of leaf, not strongly attached.

*Recently Hatched Larva*.—Length 2 mm. Width of head 0.75 mm. Head uniform, mahogany brown, decidedly broader than any other body segment. General color dirty white, with the body segments especially the first six, tending to be banded with brown. The points which become black dots in the mature larva are more or less tuberculate and bear fine, long hairs. Claws of prolegs elongate and well developed, being as long as proleg itself.

*Full Grown Larva*.—Length 34–36 mm. Width of head 2.5–3 mm. The following description is by Weeks: "Head and first segment smaller than remainder of body. Head rounded, somewhat flattened on the sides, broader at bottom than at top, strongly cleft at

summit, ground color dirty white, mouth parts black; ground color enclosing a triangular black space in front; bottom, middle and summit of eyes with black spots, sometimes confluent; eyes with exceedingly minute sparse hairs. Body cylindrical, considerably enlarged anteriorly on the third and fourth segments. Ground color dark purple. On all segments a subdorsal line of black spots, strongly edged with orange, especially on the middle segments. On the third and fourth segments, directly below the first subdorsal line, appears a second double line of black spots in pairs, each pair joined and included by an oval orange patch. On each of the other segments are two other spots directly behind the first subdorsal. These are edged with orange, especially in front and more conspicuously on the middle segments. The black spots, especially at the middle segments have a slight tuberculous tendency and from each of them a single, short minute black hair projects, barely visible to the naked eye. There is also a row of sublateral patches, white anteriorly, orange posteriorly, broadest behind and narrowing toward the front, each patch containing from three to seven irregularly located and varying velvety black dots. The first and second pair of anal legs are wanting. The larva is consequently geometriform and has the geometriform mode of progression. The fore legs are black, with whitish orange towards the base. Anal legs orange on the outside, their color being confluent with the lateral patch except in last pair. Anal legs somewhat projecting behind. A cluster of five or six minute hairs projects horizontally and directly above and between the anal claws. The rows of subventral black dots nearly correspond as to position with the subdorsal but want color; from each dot, hairs similar to subdorsal project."

*Pupa*.—Length 10 mm. Width 4 mm. Color uniformly reddish brown.

*Cocoon*.—Length 15 mm. Width 10 mm. Oval, thin, parchment-like covering with particles of soil or other foreign matter attached to outer surface.

This species is found along the Atlantic Coast. Smith (Trans. Am. Ent. Soc., vol. 27, p. 60) gives the distribution, "New York and southward to Florida and Texas, not common." The local records which we have obtained are as follows: Rye (J. A.); New York and vicinity (Elliot Coll.); Long Island (Shoemaker, Doll); Great Kill,

S. I. (W. T. Davis; NEW YORK. Elizabeth, around edge of salt meadow, larva June and August, adults May 20, June 5, July 5-20, August 20, October 1 (Buchholz); (the latter record is hard to account for); Little Ferry, August 19 (Wormsbacher); Stone Harbor, August 12 larva, May 16 adult (Daeke); Cape May (Laurent); Newark and Arlington, first brood of moths, end of May and beginning of June, second brood July and August (Rummel). Our own records are Rutherford (nursery); Arlington (meadow and nursery); Atlantic Highlands (meadow); Eatontown (nursery); NEW JERSEY.

At the few places where the insect was noted in nurseries it was not abundant enough to require remedial measures. Should such measures be necessary, however, the insect could undoubtedly be controlled by spraying with arsenate of lead. As it passes the winter in the cocoon, clean culture would probably destroy many of them. This is what appears to have happened in a nursery block at Rutherford, where the insects were noted in 1917. The fallen leaves, etc., about the plants were raked up and destroyed and as a result very few larvæ noted the following season.

#### ***Papaipema nitela* Gn.**

During the early summer, the injury of this insect was observed in a field patch of the swamp rose-mallow at Rutherford, N. J. The infested shoots were not abundant, but here and there one could be detected by the wilted condition of the leaves and tips.

This insect and its life history are too well known to need much comment here. It is distributed throughout New Jersey and is sometimes common. According to Smith (Insects of New Jersey, 1909) its normal food plant is ragweed (*Ambrosia trifida*), but it is a general feeder and may also infest dock and a number of other plants, including when abundant such cultivated plants as tomato, potato, corn, etc.

The eggs are deposited in the fall; the larva bores in the stem; may infest several in succession, especially if they are small: pupates in the stem. In New Jersey adults occur from late July to September.

Cultivated plants are especially liable to attack if there are numerous weeds growing in the vicinity and this was just the case in the infested hibiscus plots at Rutherford, where there were not only

many weeds around the patches, but some in them as well. Under ordinary conditions where the rose-mallow is grown as an ornamental, it is doubtful if the plants would very often become infested.

#### OTHER LEPIDOPTERA.

Two or three different times during the summer single, slender, rather prettily marked geometrid larvæ were found feeding on the blossoms of the swamp rose-mallow. One of these was bred to maturity and proved to be a species of *Eupithecia*.

#### OTHER INSECTS INFESTING THE STEMS AND LEAVES.

##### **Neolasioptera hibisci** Felt.

This cecidomyid was described by Felt in 1907 (N. Y. State Mus. Bull., 110, 155-6) under the generic name *Choristoneura*. Dr. Felt stated that it was bred April 25, 1907, from slightly enlarged stems of the rose marsh-mallow (*Hibiscus moscheutos*) taken on Staten Island, N. Y. (Type Cecid. a 1410, N. Y. State Mus.) He again mentions this species in his reports for 1907 (N. Y. State Mus. Bull., 124, p. 320 and 333) and 1916 (N. Y. State Mus. Bull., 198, p. 196), and in the latter describes the gall and larva as well as again giving descriptions of the male and female and figuring burrows in the stem.

The gall of this species is an abnormal thickening of the stem of the hibiscus. Concerning it, Felt says: "Infested stems can usually be discovered by a somewhat abnormal thickening, though occasionally a badly infested stem may be nearly twice the usual size. The female appears to deposit eggs in a small slit in the stem, the larva usually tunneling the pith and frequently excavating a channel just beneath the surface. The larvæ occur singly or in numbers in the pith and occasionally in the outer portions of the tissues. One stalk may be infested by only a few larvæ or may contain 50 to 100 or more."

These galls were first noted by us in August, 1917, in a bed of hibiscus seedlings in a nursery at Rutherford. The plants varied from six to fifteen inches in height and several of them showed the gall-like swellings which contained larvæ and a few pupæ. Adults emerged from these later in the month. Later, during 1917 and several times during the present year 1918, these galls have been



observed on more mature stems. The galls vary from one and one half to four inches in length and sometimes there is scarcely a trace of the swelling. Most of the larvæ have been in the swollen part of the gall, but sometimes a few have been found in the stem above the swollen part.

A number of galls have been examined, and while we have found a number of larvæ in some, we have never found as many as Dr. Felt suggests may occur, although their number varies. On October 27, 1918, seventeen galls were collected and examined; eight contained nothing while exit holes were noted on the outside of the galls. The remaining nine contained larvæ as follows: 2, 7, 3, 5, 10, 8, 4, 17. It is evident that the insect hibernates in the gall and emerges in the spring. This accounts for the April records. Our own specimens both seasons emerged in August, but whether the insects occur in broods we are unable to say.

The description of the larva is given by Felt as follows: "Length 4 mm., rather stout, light yellowish. Head small, antennæ uniarticulate, slender, tapering; breast bone stout, somewhat expanded apically, bidentate and with a rudimentary median tooth; skin finely shagreened; posterior extremity broadly rounded." It will not be necessary to give the descriptions of the adults.

It is sufficient to note that this cecidomyid is a rather pretty species, being dark brown in color with lighter markings of golden yellow and silvery white; posterior tarsi with second to fourth segments banded at both extremities and antennal segments of male are 15 to 16, while those of the female number 23.

Our records of distribution are Staten Island, N. Y. (Felt); Rutherford, Arlington, Atlantic Highlands and Palmyra, N. J. The gall does not seem to be particularly injurious to the plant.

#### PLANT LICE.

Plant lice were observed on the hibiscus plants, both in the nursery at Rutherford and the marsh at Arlington early in July. A few days later they were noted on plants in the marsh at Ridgefield and at one or two other points later in the season. At Rutherford they continued on the plants throughout the season and on October 24, after the temperature had been low enough to effect many of the

leaves, several of the latter least affected were found to be infested with both winged and wingless forms. They of course were inactive due to the low temperature.

The infestation in the nursery was somewhat scattered, and while some leaves were badly infested, the resulting injury was not very apparent, as infestation could usually only be determined by examining the under surface of the foliage. Parasitism was in evidence, but not sufficient to materially check the development and continuation of the species throughout the summer. The parasite bred from the aphids was determined by Mr. Gahan through the courtesy of Dr. L. O. Howard as a species of *Aphidius*.

The plant lice noted in the several localities were evidently all of one species which was identified by Prof. C. P. Gillette as *Aphis gossypii* Glover. According to Dr. Patch (Food Plant Cat. of Aphididae of World, Maine Agric. Exp. Sta. Bull. 270) there are three other species infesting species of *Hibisci*, *Aphis Malvæ* Walker, *A. medicaginis* Koch and *Rhopalosiphum dianthi* Schr.

#### LEAF HOPPERS.

On nursery plants of hibiscus both at Rutherford and South Orange, adults and nymphs were observed infesting the lower surfaces of the leaves. They were not abundant, but judging from the fact that some of the nymphs were very young, it was quite evident that oviposition and development occurred on the plants. Infestations occurred throughout the season and as late as October 24 both nymphs were to be found on some of the leaves at Rutherford. Specimens were kindly identified by Dr. Ball, who stated that the species was *Empoasca mali* LeB., and wrote as follows: "The specimens you sent were unquestionably those of *Empoasca mali* LeB., the commonly known 'apple leaf-hopper,' which I am going to rechristen 'the potato leaf-hopper.' This species was seriously abundant on potatoes throughout the northern section, from Montana east this season. It also attacks nursery stock and water sprouts of apple trees, but not the older and more slowly growing leaves of the apple. This species hibernates as an adult, so far as I have been able to determine, while *Empoasca unicolor*, which is the real apple leaf-hopper, deposits its eggs in the apple twigs and spends its whole

life—a single generation a year—on the apple tree. This is the real apple leaf-hopper, but in most of the work on that so-called species these two and *rosæ* have been mixed.”

#### ALEYRODIDÆ.

In August, specimens of “white fly,” both adults and nymphs, were observed on *Hibiscus moscheutos* in one of the nursery blocks at Rutherford. The specimens were few in number and the species was not determined. The infestation, however, may have been incidental.

#### COCCINELLIDÆ.

Both larvæ and adults of a few species of *Coccinellidæ* were observed on the plants at Rutherford. They were evidently feeding on the plant lice and adults of the following were collected, *Hippodamia 13-punctata* L., *H. convergens* Guer., *Coccinella 9-notata* Hbst., and *Adalia bipunctata* L.

#### CAMBIUM MINER.

At Atlantic Highlands, N. J., and Rutherford, N. J., what appeared to be the work of a cambium miner was observed on the stems. No specimens were found and the identity of the species is unknown to us.

#### ERASTRIA AMATURARIA Walk.

A loosely folded hibiscus leaf containing a pupa was noted at Rutherford on August 10. The adult which emerged proved to be this species. The species is recorded as common and the larva is said to feed on *Polygonum dumetorum*, so that the occurrence on hibiscus may be accidental.

#### SCUDDERIA TEXENSIS S. & P.

A visit to Arlington soon after the flower buds became well developed revealed the fact that a number of them had been partially eaten. Closer observation showed that the injury was caused by a species of *Locustidæ* identified by Mr. W. T. Davis as *Scudderia texensis*. Two specimens of this species were captured while feeding on the buds. Other species of *Locustidæ* and *Acrididæ* were also present in the area where the mallows were growing, so that some of them may have been responsible also for a part of this injury.

## INSECTS IN THE DRIED STEMS.

On several occasions during the fall indications of insect activity have been observed in the dried hibiscus stems remaining in the field. In quite a few instances dead stems had the pith removed and the channel divided off into cells. These cells contained dried pupal shells, evidently those of a hymenopteron. In another instance, we found somewhat similar cells in the pith packed with plant lice, which had evidently been stored there by a species of Pemphredonidæ.

## INSECTS FOUND IN BLOSSOMS.

## COLEOPTERA.

**Conotelus obscurus** Er.

Common in various places where flowers were examined. This species is widely distributed and common in *Convolvulus* and other flowers.

**Chauliognathus pennsylvanicus** DeG.

Found in hibiscus flower at South Amboy, N. J., August 15. Common, also found in golden rod, wild carrot, etc.

**Diabrotica 12-punctata** Oliv.

In all localities in hibiscus blossoms. This species is common on many plants; larva injures roots of corn and grasses.

**Bruchus discoideus** Say.

Westville, August, one specimen.

**Mordella octopunctata** Fab.

Aqueduct, Long Island, N. Y., viii, 1918; collected on blossom (Geo. P. Engelhardt).

## HEMIPTERA.

**Triphleps insidiosus** Say.

Found in nearly all localities where flowers were examined. This common parasitic hemipteron is found in various blossoms.

## HYMENOPTERA.

**Agapostemon virescens** Fab.

Atlantic Highlands, August 15.

**Agapostemon splendens** Lep.

Lawrence Station, August 19; Riverton, August 16.

**Melissodes** sp.

Riverton, August 16; South Orange, August 12.

**Melissodes bimaculata** Lep.

Eatontown, August 20; South Orange, August 12; Springfield, August 3.

**Xenoglossa pruinosa** Say.

Springfield, August 3; South Orange, August 12; visits flowers of cucurbits by preference.

**Emphor bombiformis** Cress. var. **albojulatus** Ckll.

In several localities where flowers were examined. The life history of this species was worked on by the late Mr. J. A. Grossbeck, who found that the hibiscus pollen gathered served as food for the larvæ.

**Clisodon terminalis** Cress.

Rutherford, August 16.

**Bombus fervidus** Fab.

**Bombus impatiens** Harr.

**Bombus bimaculatus** Cress.

**Bombus auricomus** Rob.

DIPTERA.

Specimens of a cecidomyid submitted to Dr. Felt, were in the absence of males identified as probably one of the Diplosids.

INSECTS FOUND IN DEVELOPING FOLDED LEAVES.

Two species of *Coleoptera*, namely, *Aphrastus taeniatum* Gyll, and *Gymnetron tetrum* Fab., were quite common at Rutherford during the second and third week of July, in the developing folded leaves at the tips of the shoots. No feeding could be detected.

ACKNOWLEDGMENTS.

It is a pleasure to acknowledge our indebtedness to Mr. C. W. Leng, who aided us considerably by identifications and references to the literature, and to Dr. L. O. Howard and the specialists named in the text, Dr. E. P. Felt, Dr. F. E. Lutz, Mr. C. A. Frost, Mr. W. T. Davis, Dr. J. Bequaert, Prof. H. C. Fall, Mr. H. Hornig, Mr. Frank Watson, and Mr. G. M. Greene for records, identifications and other

help. To Mr. Erdman West and Mr. Breeder our thanks are due for the photographs.

EXPLANATION OF PLATES X, XI, XII.

- Fig. 1. A nursery patch of *Hibiscus moscheutos* during the winter.  
Fig. 2. *Acontia delecta* adult.  
Fig. 3. *Acontia delecta* with wings folded.  
Fig. 4. *Gelechia hibiscella* adult.  
Fig. 5. Larvæ of *Acontia delecta*.  
Fig. 6. Petioles injured by larvæ of *Rhabdoscelis tenuis*.  
Fig. 7. Work of larvæ of *R. tenuis* in hibiscus stems, showing larva in one of the left.  
Fig. 8. Cocoon of *Sagaritis dubitatus* with shrivelled larval skin attached.  
Fig. 9. Work of larva of *Papaipema nitela*.  
Fig. 10. Feeding (large holes) of *Rhabdoscelis tenuis*.  
Figs. 11 and 12. Galls of *Apion hibisci*.  
Fig. 13. Stem split to show cavity occupied by larva of *Apion hibisci*.  
Fig. 14. Gall of *Neolasioptera hibisci*.  
Fig. 15. Stem split to show cavity in pith occupied by larvæ of *Neolasioptera hibisci*.  
Fig. 16. Feeding of *Chatocnema quadricollis*.  
Fig. 17. Flower buds injured by *Scudderia texensis*.  
Fig. 18. Leaf cut and rolled by larva of *Gelechia hibiscella*.

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CICADAS OF THE GENUS *CACAMA*, WITH DESCRIPTIONS OF SEVERAL NEW SPECIES.

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

In Genera Insectorum Mr. Distant lists *Cacama maura* Dist. from Mexico and Yucatan; and both *Cacama dissimilis* Dist. and *Cacama longirostris* Dist. from Mexico. These three species were described in 1881 in Biol. Centr.-Amer., *maura* and *longirostris* under the generic name of *Proarna*, and *dissimilis* as a *Cicada*. Uhler's *Proarna valvata* described from Texas and Arizona in 1888 in Entomologica Americana, is listed in that genus in Genera Insectorum, but Mr. Van Duzee removed it to the genus *Cacama* in 1915 (JOURNAL N. Y. ENTO. SOCIETY). In the Transactions of the San Diego



Insects of the Rose-Mallow.







Insects of the Rose-Mallow.





Insects of the Rose-Mallow.



Soc. Nat. Hist., ii, p. 45, 1914, Mr. Van Duzee described *Proarna crepitans* from California, which in 1915 he also removed to the genus *Cacama*. So the genus up to the present has had five known species, three from Mexico and two from the United States.

In *Cacama* the tympanal coverings in the male entirely conceal the orifices, which is also the case in the genus *Tibicen*, but the head including the eyes is much narrower in *Cacama*, being little more than two thirds the width of the mesonotum. The abdomen is broad and much rounded behind; in *Tibicen* it is more tapering. The apical areas of the fore wings in *Cacama* are eight in number, the two lowermost small and somewhat square in shape. In *Tibicen* the two lowest apical areas are not as nearly of the same size, the seventh being much smaller than the eighth.

The type of the genus is *Cacama maura* (Distant), figured in Biol. Centr.-Amer., and also in Genera Insectorum. *Cacama longirostris* is also figured in Biol. Centr.-Amer. The remaining species, including four new ones and a female from Yucatan, which has been identified as *maura*, are figured on the plates accompanying this article. Owing to the lack of specimens available for its preparation the following table for the separation of species is not altogether complete.

#### Genus *Cacama*.

- |   |           |
|---|-----------|
| Rostrum not quite or barely reaching posterior coxæ ..... | <b>A.</b> |
| Rostrum reaching posterior coxæ or beyond .....           | <b>B.</b> |
| Rostrum reaching the first abdominal segment .....        | <b>C.</b> |

#### **A.**

- A** black species. Basal cell of fore wings usually includes a darkened area near front margin, translucent on hind margin; anal membranes of both pairs of wings grayish, sometimes slightly ochraceous with hind margins gray. First and second transverse veins of fore wings hardly infuscated. Black spot on dorsum of the pale colored eighth abdominal segment of male quadrate. Abdomen above with first segment straw colored or pruinose; beneath straw colored .....*valvata* (Uhler).
- Not** as dark in color as the last. Basal cell of fore wings ochraceous, translucent in part; anal membranes of both pairs of wings ochraceous. First and second transverse veins of fore wings slightly infuscated. Eighth abdominal segment of male almost entirely black, light colored each side at base and near extremity. Abdomen orange colored beneath. Uncus deeply notched at the extremity .....*furcata* new species.

Body considerably variegated with ochraceous; basal cell of fore wings ochraceous, translucent in part; anal membranes of both pairs of wings orange. First and second transverse veins of fore wings infuscated. Black spot on dorsum of eighth abdominal segment in male inversely napiform (turnip-shaped) .....**variegata** new species.

Resembles *variegata* in color and size, but with head usually smaller and the narrowed fore wings with outer margin more straight. Basal cell of fore wings nearly clear; first and second cross veins hardly infuscated.

**californica** new species.

### B.

Basal area of fore wings "slightly ochraceous and opaque"; anal membranes of fore and hind wings orange with hind margin gray. First and second transverse veins of the fore wings "scarcely infuscated."

**dissimilis** (Distant).

Resembles *valvata* in being a black species, but has a larger head and is more hairy beneath about the legs. Basal cell of the fore wings blackish, translucent in part; anal membranes of both pairs of wings dark gray, abdomen above, entirely black at base. Dorsum of the eighth abdominal segment of male black with a small pruinose area each side.

**carbonaria** new species.

Basal cell of the fore wings translucent in part; anal membranes of the fore and hind wings orange. First and second transverse veins of the fore wings infuscated .....**crepitans** (Van Duzee).

Basal area of fore and hind wings black, first and second transverse cross veins of the fore wings infuscated .....**maura** (Distant).

### C.

Basal area of the fore wings black, cell partly clear, first and second cross veins not infuscated .....**longirostris** (Distant).

### **Cacama valvata** (Uhler).

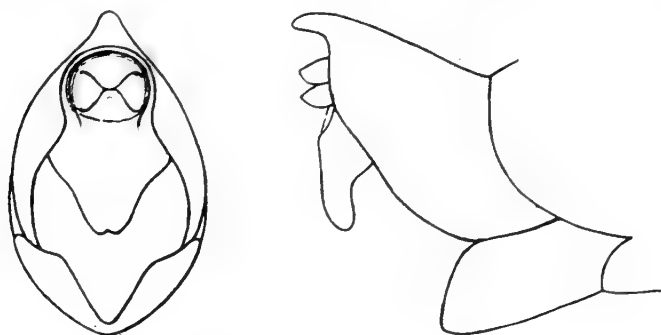
1888. *Proarna valvata* Uhler. Entomologica Americana, IV, p. 84.

Specimens examined: Tascosa, Tex., June, 1918, male (Miss McGill), D's Coll. Pecos River, Tex., May 24, male, U. S. Nat. Mus. Coll. Devil's River, Tex., July 3, 1917, male, Cornell University Coll. Jemez Springs, N. M., 6,400 ft., 15 males, 3 females, June, 1918, and 6 males, 3 females, July 2 and 3, 1918 (John Woodgate), D's Coll. Alamogordo, N. M., June 6 and 7, 1902, Coll. Acad. Nat. Sci. Phil. Pueblo, Col., June 15, 1900, male (Univ. of Kans.), D's Coll. Pueblo, Col., June 15, 1900, 3 females, E. D. Ball Coll. Carson City, Col., July 3, male, D's Coll. Trinidad, Col., June 3, 1910, male (F. C. Bishopp), U. S. Nat. Mus. Coll. Cañon City, Col., July

3, male, U. S. Nat. Mus. Coll. Holly, Col., June 19, 1900, male, E. D. Ball Coll. Coolidge, Col., June 18, 1900, male, E. D. Ball Coll. Ft. Collins, Col., June 28, 1900, male, E. D. Ball Coll. Kanab, Utah, June 24, 1913, male (E. D. Ball), D's Coll. Kanab, Utah, June 24, 1913, two males and female (E. D. Ball), Coll. Dr. Ball. Arizona, male, labeled "*P. valvata* Uhler," by Uhler, U. S. Nat. Museum Coll. Bradsh Mts., Ariz., June 22, 1892, two males, Coll. Oregon Agri. College. Rincon Mts., Ariz., male and female, D's Coll. Nogales, Ariz., July, female (Oslar), D's Coll. Grand Canyon, Ariz., sage bush country half way level in Canyon, June 5, 1915, male (B. B. Fulton), D's Coll. Grand Canyon, Ariz., Indian Garden, June 9, 1916, male (Geo. P. Engelhardt), D's Coll.

The two males from the Grand Canyon are smaller than the others in my collection.

Uhler in the original description mentions three males as typical specimens, one "from the vicinity of the Pecos River in Texas, and



*Cicada valvata*

the others were captured in Arizona." The remaining specimen mentioned by him from Camp Grant, Arizona, with "a much longer rostrum than the types," is in the collection of the U. S. Nat. Museum. In addition to the locality it is labeled "Palmer's Assorting No. 1043." The rostrum reaches the posterior coxæ, and we think the specimen is referable to *Cicada dissimilis* (Distant).

Mr. Woodgate writes of the *valvata* he sent from Jemez Springs, N. M., that they were very shy and often found about the bush cactus. Some he took in the evening while they were at rest on the cactus. "They are the only insects except ants that can settle on the bush

cactus without impaling themselves. The toughest beetles become impaled when they settle on this cactus and the ants proceed to eat them, but these Cicadas that have a very swift flight, can settle with impunity." He says that "their song is not sustained for more than about two minutes in the brightest sunshine even."

***Cacama furcata*** new species.

Type male, labeled "Lower California?" Collection, University of Nebraska.

A dark colored species decorated with orange and black at the base of both pairs of wings.

Head black with a light brown spot above each antenna and a median light brown line below the central ocellus. Region of the transverse rugæ black, variegated each side with brown and black. The orange colored rostrum is black at tip, and extends slightly beyond the median coxæ. Pronotum black or nearly so, with a brownish spot on the front margin each side of the central line; the lateral margins variegated with brown, and a rather conspicuous upturned brownish line near the posterior angles. Mesonotum black, except the outer two lines of the central W mark, the extreme lateral margins at the base of the fore wings, and the front limbs of the X, which are brownish. Tergum black or nearly so, with the segments narrowly edged



*Cacama furcata*

at the sides of the body with brown. The first segment almost entirely black, the hind margin edged with brown, especially conspicuous near the central portion, and a minute pruinose spot each side near the extremities and adjoining the tympana. The eighth segment is nearly all black, light brown near the tip and on the sides; there is also a basal pruinose line. Fore wings with the basal cell nearly clear; both the fore and hind wings are variegated at base with orange and black; the membranes are orange tinted with gray on their posterior margins. Costal margin of the fore wings testaceous with a series of connected darker spots to the end of the radial cell, from which point the margin is darker colored to the end of the wing. The outer margin of the fore wing is nearly straight, somewhat abruptly turned at the eighth



marginal cell; the first and second cross veins are hardly infuscated. Beneath the insect is almost wholly dull orange in color, variegated with black about the legs and at the sides of the abdomen. Opercula dull orange, overlapping along the inner margin and broadly rounded behind. Uncus deeply notched at the extremity.

## MEASUREMENTS IN MILLIMETERS.

	Male Type.
Length of body .....	27
Width of head across eyes .....	8.5
Expanse of fore wings .....	72
Greatest width of operculum .....	7
Greatest length of operculum .....	7

This is a smaller species than *valvata*, more orange colored at the base of the wings, with the eighth abdominal segment nearly all black instead of pale. Beneath it is orange colored as in *crepitans*, and not pale, especially the opercula, as in *valvata*. The rostrum is longer than in *valvata*, but not as long as in the much smaller *crepitans*.

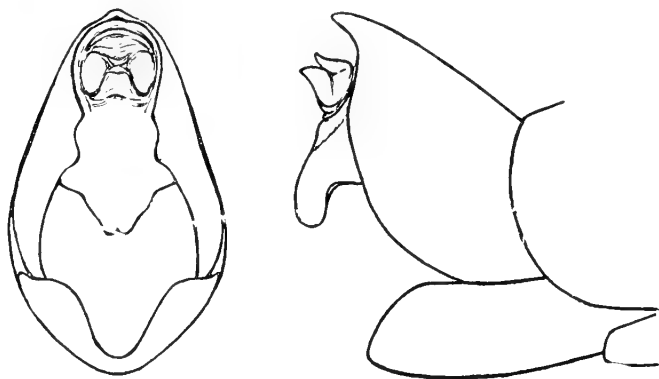
For the privilege of describing this species I am indebted to Prof. Myron H. Swenk, of the University of Nebraska.

***Cacama variegata*** new species.

Type male and allotype female from San Benito, Texas, June, 1918 (Miss Matz). Davis collection.

Head black with a brownish spot above each antenna; one near each posterior ocellus, and one centrally on the hind margin; also one in front of the central ocellus. Upper area of transverse rugæ black, centrally with a brown streak; face light colored and pruinose; white hairs especially about the eyes. The testaceous colored rostrum is blackened at the tip and extends slightly beyond the median coxæ. Pronotum black, much variegated with light brown and rusty brown; the hind margin is edged with brown which extends inward (forward) near the posterior angles. The central area is rusty brown, each side of a somewhat lighter colored oblong spot. Mesonotum black with the outer lines of the W mark well defined. The mesonotal X is brown, the front limbs and hind limbs being each crossed by black bands. There are two oblong spots in the depression in front of the X. The sides are light colored, overlaid with pruinose which extends forward along each side to the hind margin of the pronotum. Tergum black, exposed part of first segment light colored and pruinose; second segment margined behind centrally with brown; third segment with a light colored spot each side, which is also more or less pruinose; eighth segment light colored and pruinose with an apical inversely napiform black spot. Two black dots, one each side, are included in the pruinose area. Fore wings with the basal cell partly obscured, especially at

the base and front margin; both the front and hind wings are variegated at base with testaceous and black, the membranes are orange. Costal margin of the fore wings testaceous with a series of connected darker spots to the end of the radial cell, from which point the margin is darker colored to the end of the wing. The outer margins of the fore wings are more evenly rounded than in any other species here considered; the first and second cross veins are considerably infuscated. Beneath the body is light or straw colored, especially the opercula, variegated with black about the legs and at the sides of



*Cacama variegata*

the abdomen. Opercula overlapping along the inner margin and broadly rounded behind.

MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	29	27
Width of head across eyes .....	9.5	9.5
Expanse of fore wings .....	75	79
Greatest width of operculum .....	7.5	
Greatest length of operculum .....	8.5	

The allotype, and other females collected at the same time, have more brown on the tergum than in the males. The first abdominal segment is pruinose, which extends on to the fore part of the second segment; the third to the seventh segments are pruinose on the sides, while the eighth segment is light colored and pruinose. There are the same black or dark brown dots each side on the eighth segment as in the male. The ninth segment is also light colored. Beneath the last ventral segment is evenly rounded each side of the central notch.

In addition to the type and allotype there are 17 males and 15 females in the writer's collection, all from San Banito, Texas, and col-

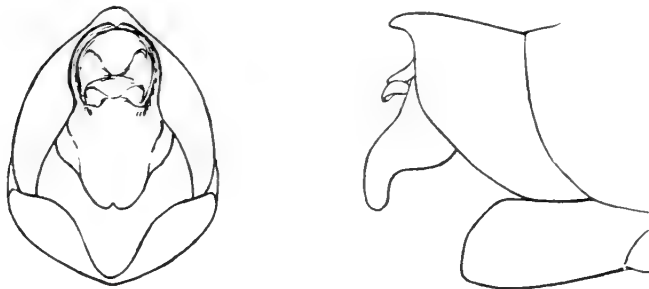
lected in June, 1918. In the collection of the U. S. National Museum there are the following specimens: San Diego, Tex., May 5, male (E. A. Schwarz); McAllen, Tex., May 22, male (McMillan); Cotula, Tex., May 10, 1906, six males and three females, May 11, 1906, ten males and seven females, June 1, 1906, female, all collected by Crawford and Pratt, and one male collected May 12, 1906, by F. C. Pratt.

This species can be separated from all of the others here considered by the shape of the fore wings, which, as has been stated, are more evenly rounded, that is, the outer margin is not as straight as it is in the others.

***Cacama californica* new species.**

Type male and allotype female from Los Angeles County, California, July (Collection Coquillett). U. S. National Museum.

This species resembles *Cacama variegata* in color pattern and general appearance, and the rostrum is of the same length, but it differs otherwise in the following particulars: The head is usually smaller; the fore wings are narrower with the outer margins more straight, and with the space between the marginal cells and the edge of the wings very broad. The basal cell is nearly clear, and the first and second cross veins are hardly infuscated. A side view of the abdomen shows the operculum to be sinuated on the margin, instead of evenly curved as in *variegata*. The opercula are also shorter though



*Cacama californica*

of the same general shape. The end of the abdomen as viewed either from above or below is seen to be broader or more flattened out.

MEASUREMENTS OF MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	27	27
Width of head across eyes .....	9	9.5
Expanse of fore wings .....	76	79
Greatest width of operculum .....	7	
Greatest length of operculum .....	6	

In addition to the type and allotype, ten males and three females were collected by Mr. Coquillett in Los Angeles County, California, in July. In the collection of Dr. E. D. Ball there is a female collected by him at Cabazon, Calif., June 20, 1909.

This species is not quite as contrastingly colored as in *variegata*; the membranes at the base of the wings are not so deeply orange in color, being more yellowish and gray.

**Cacama dissimilis** (Distant).

1881. *Cicada dissimilis* Distant, Biol. Centr.-Am., Homop. 1, p. 10.

Three males and one female identified as this species and from the collection of the University of Nebraska, have been examined. They are labeled Sonora, Mex., Eisen Collector. In the Uhler collection, U. S. National Museum, is the male already mentioned from "Camp Grant, Ariz. (Palmer), Palmer's Assorting, No. 1043," which has been compared with one of the males from Sonora, Mexico. All of these specimens have the rostrum reaching to about the middle of the posterior coxæ; first and second transverse veins of the fore wings are "scarcely infuscated" as stated in the original description. The original description further states that the basal area is "only slightly ochraceous and opaque," which is also true of the specimens mentioned above.

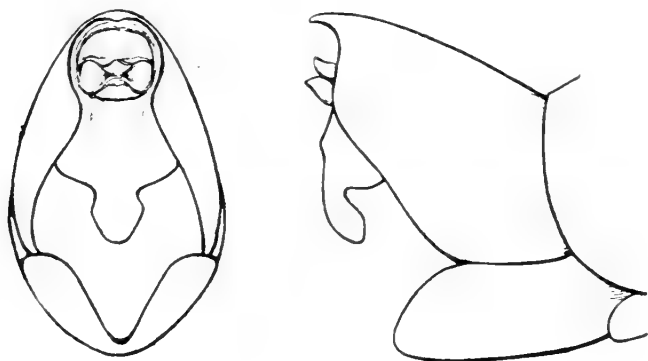
**Cacama carbonaria** new species.

Type male, in Davis collection, and presented to the writer by Dr. E. D. Ball, who states that it came from near Mexico City, Mexico. It bears the number "337."

This is a very black species and resembles *Cacama valvata* in size and color.

Head black with a brown spot above each antenna, one each side on the hind margin near the posterior ocelli, one in front of the median ocellus, and a line on the front in the region of the transverse rugæ. The brown rostrum is long and extends to the posterior coxæ, but hardly beyond them. The face is black with white hairs; a pale stripe follows the sides of the transverse rugæ, and a second one leads from the base of the rostrum toward each eye. The pronotum is black and pubescent, as in *valvata*; on the hind margin there is an irregular brown spot each side that extends nearly to the posterior angles. Mesonotum black, slightly lighter near the base of the wings. The X has the fore limbs brown, each one bearing a black spot; the hind limbs are black. Tergum black, including the exposed part of the first segment, which is light colored and *pruinose* in *valvata*. On each side there is a *pruinose* spot, which covers the lower part of the tympanum and extends to the fourth

segment. The eighth segment is nearly all black, with a small light spot each side, which is also pruinose. Fore wings with the same testaceous and black colors at base, as in *valvata*, and the anal membranes of both pairs of wings likewise gray. About one third of the basal area is clear also as in *valvata*. The first and second transverse veins of the fore wings are slightly infuscated. Beneath the opercula are dull straw colored as in *valvata*, but the ends of the second and third pair of coxæ are orange colored. The opercula overlap along the inner margin and are broadly rounded at the extremities. A side view of the abdomen shows the operculum to be sinuated on the margin in order to cover a more protruding tympanum than is found in *valvata*. The end of the abdomen is considerably broadened out at the extremity; much more so than



*Cacama carbonaria*

in *valvata*. When viewed in profile the uncus is seen to be deeply sinuated near its central portion.

MEASUREMENTS IN MILLIMETERS.

	Male Type.
Length of body .....	29
Width of head across eyes .....	10
Expanse of fore wings .....	73
Greatest width of operculum .....	7
Greatest length of operculum .....	7

This is a larger headed and proportionately broader bodied species than *valvata*; the rostrum is also much longer and the uncus differently shaped.

I am indebted to Dr. Ball for permission to retain the specimen.

*Cacama crepitans* (Van Duzee).

1914. *Proarna crepitans* Van Duzee, Trans. San Diego Soc. Nat. Hist., 2, p. 45.

Mr. Van Duzee says in the original description: "Described from

seven male examples taken in Mission Valley on the hillside opposite the city of San Diego, July 9, 1913. This species makes an unusually loud crackling noise which is often repeated and well sustained, but the insect was very active and difficult to capture, especially as its home was among the cactus on the steepest part of the hill."

Mr. Van Duzee has been good enough to send me one of the above mentioned males, in addition to which I have, through the kindness of Prof. Myron H. Swenk, been able to examine two additional males from the collection of the University of Nebraska. One is labeled San Jose del Cabo, "Lower California, Mexico, Eisen Coll., 1893," and the other simply "Lower Calif.?"

**Cacama maura** (Distant).

1881. *Proarna maura* Distant, Biol. Centr.-Am., Homop., 1, p. 13, pl. 2, fig. 5.

The original description states of the fore wings that the "basal area, costal membrane, and transverse veins at bases of second and third apical areas black." Basal area of the wings also black. It is said to inhabit Mexico, also Yucatan.

In the collection of the U. S. National Museum there are several specimens from Yucatan labeled *maura*, which are brownish instead of black. There is also a chestnut-brown female in the writer's collection from Yucatan, supposed to belong to this species, and which is figured on the accompanying plate.

**Cacama longirostris** (Distant).

1881. *Proana longirostris* Distant, Biol. Centr.-Am., Homop., 1, p. 13, pl. 2, fig. 4, 4a and 4b.

In the original description is the statement that the tegmina have a "black basal area," but a smaller one than in *maura*. Fig. 4 *b*, referred to above, shows the rostrum extending beyond the opercula to the "apex of the first abdominal segment."

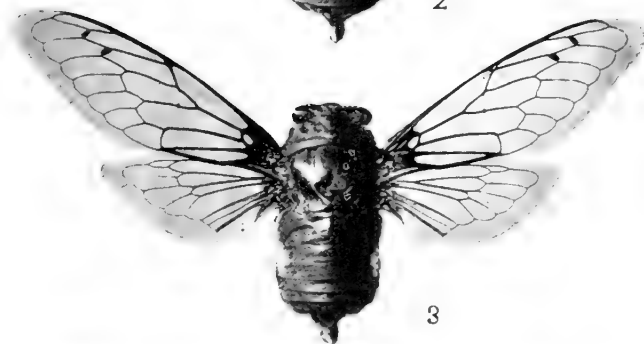
Uhler, in *Entomologica Americana*, Vol. IV, p. 84, 1888, says of *longirostris*: "Inhabits Mexico. It resembles the preceding species [*maura*] in form, but has a much longer rostrum, and lacks the broad tract at the base of the wings."



Cacama.







Cacama.



## EXPLANATION OF PLATES.

## PLATE XIII.

- Fig. 1. *Cacama valvata* (Uhler).  
Fig. 2. *Cacama furcata* Davis. Type.  
Fig. 3. *Cacama variegata* Davis. Type.  
Fig. 4. *Cacama variegata* Davis. Allotype.

## PLATE XIV.

- Fig. 1. *Cacama californica* Davis. Type.  
Fig. 2. *Cacama dissimilis* (Distant).  
Fig. 3. *Cacama carbonaria* Davis. Type.  
Fig. 4. *Cacama crepitans* (Van Duzee). Cotype.  
Fig. 5. *Cacama maura* (Distant).

♦

## KEY TO THE NEARCTIC GENERA AND SPECIES OF BERYTIDÆ (HETEROPTERA).

BY W. L. McATEE,

WASHINGTON, D. C.

The Berytidæ are an assemblage of small- to medium-sized bugs of slender build. The long filiform antennæ are distinctly elbowed and the head has a definite constriction or transverse sulcus in front of the ocelli. The first joint of the antenna, and the femora are clavate, and the slender legs are more or less thickly beset with short bristles or bristled tubercles. The scutellum is small, leaving the triangular space between the clavi partly open.

In the following treatment of the family descriptions of genera do not repeat the family characters, nor do those of species reiterate the characters of their respective genera. Distribution is not given in detail for the most common and widespread forms. The measurements of total length refer to the body proper, between apices of tylus and elytra, and do not include the antennæ.

It has been the custom to refer to certain metathoracic tubercles of the Berytidæ as breathing-horns, or the equivalent of that term in various languages. It is evident, however, that these organs in their entirety are exact homologues of what are called in all the other groups of Heteroptera possessing them, ostioles with their accom-

panying canals and tubercles; which are believed to be the orifices through which the odoriferous secretions of the bugs are given off. The structure of the ostiole, ostiolar canal and tubercles are of much more importance in the classification of the Berytidæ than has yet been recognized and in this paper the primary division of the family is made upon this structure.

The Berytidæ would appear to be rather far advanced in their evolutionary history, the species not showing very extensive variation, and the number of groups of generic value being large in proportion to the number of species.

For the loan of material used in the preparation of this paper the writer is obliged to Mr. J. C. Crawford, Associate Curator of the Division of Insects, U. S. National Museum, and to Mr. E. P. Van Duzee, of the California Academy of Sciences.

#### KEY TO THE GENERA.

- A. Metathorax with distinct ostiolar canal running (at least as a suture) from coxal cavity to and upon ostiolar tubercle which sometimes is long and spines-like; Berytids with few spines on upper surface of body.
- B. Ostiolar process long, more or less spine-like.
  - C. Ostiolar process long, posteriorly curved and twisted so that ostiolar canal, which channels it to apex, lies at first on outer side, but apically on its upper surface, apex without spine; terminal antennal joint about as long as head; fore coxæ separated by a narrower scarcely sulcate area.
    - Aknisus** n. gen., p. 81.
  - CC. Ostiolar process shorter, less curved, and not twisted, canal entirely on the outer side, apex of process a rather long spine; terminal antennal joint longer than head; fore coxæ separated by a broader distinctly sulcate area. . . . **Jalysus**, p. 85.
- BB. Ostiolar tubercle low, not at all spine-like.
  - D. Head with a porrect decurved spine; front of thorax unarmed.
    - Neides**, p. 87.
  - DD. Head without spine; front of thorax with an erect sharp spine at each side . . . . . **Protacanthus**, p. 87.
- AA. Metathorax without external ostiolar canal; ostiole small, on apex of the ostiolar tubercle; Berytids with numerous spines on upper surface of body.
  - E. Head with only a single spine or tubercle on middle of vertex; elytra without spines; ostiolar tubercle a low, rounded cone.
    - Pronotacantha**, p. 88.

EE. Head with several strong spines; veins of corium spinose; ostiolar tubercle a short, curved, cylindrical process.

F. Membrane of normal extent; juncture of marginal and terminal veins of corium far cephalad of end of abdomen; veins of corium with a moderate number of fairly strong, curved spines; mesosternum conspicuously tumid.

*Saurocoris* n. gen., p. 89.

FF. Membrane much reduced, juncture of marginal and terminal veins of corium almost over end of abdomen; membrane forming an acuminate terminal appendage of elytron; corium expanded and inflated, its veins with a large number of long, curved spines; mesosternum not at all tumid.

*Acanthophysa*, p. 90.

***Aknisus*** new genus.

The diagnostic characters are given in the key; further brief description of the more characteristic features is given, however, as in the case of all the other genera.

Front of vertex with or without more or less pointed tubercles; thorax with distinct callosities, median line somewhat calloused and elevated, sides very low carinate, and region within humeri elevated; scutellum with short sharp almost upright spine; elytra delicate, hyaline, very sparsely punctate; ostiolar process long, posteriorly curved and twisted so that ostiolar canal, which channels it to apex, lies at first on outer side but apically on its upper surface, apex without spine; beak extending slightly beyond middle coxæ; rostral sulcus, scarcely evident on prosternum, fairly wide with rather swollen margins (lacking indentations) on mesosternum, narrowed between middle coxæ, expanding on metasternum into a diamond shaped basin with corresponding broad rounded margin, well marked and percurrent on first abdominal segment.

The type of the genus is *Aknisus calvus* new species. I would select *Hoplinus multispinus* Ashmead as genotype, because of its being the earliest species, were not the standing of that name in controversy.

KEY TO THE SPECIES.

Front of vertex with a short, but distinct pointed tubercle.

*multispinus* Ashmead.

Front of vertex without pointed tubercle ..... *calvus* n. sp.

**Aknisus multispinus** Ashmead.

*Hoplinus multispinus* Ashmead, W. H. Hemipterological Contributions (No. 1), Entomologica Americana, Vol. 3, No. 8, Nov., 1887, p. 155 [Florida].

*Jalysus perclavatus* Van Duzee, E. P. Observations on some Hemiptera taken in Florida in the spring of 1908. Bul. Buffalo Soc. Nat. Sci., Vol. 9, No. 2, 1909, pp. 163-4. [Crescent City, Sanford, Tampa and St. Petersburg.] Nomenclatorial and critical notes on Hemiptera, Can. Ent., Vol. 46, No. 11, Nov., 1914, pp. 380-381.

*Jalysus (Hoplinus) multispinosus* Barber, H. G. Descriptions of some new Hemiptera-Heteroptera. JOURN. N. Y. ENT. SOC., Vol. 19, No. 1, March, 1911, p. 24.

*Hoplinus (?) multispinus* Van Duzee, E. C. Check List of the Hemiptera . . . of America, North of Mexico, 1916, p. 17, Catalogue, id., 1917, p. 144.

In addition to the characters mentioned in the keys it is necessary only to state that this insect is pale stramineous with eyes, terminal antennal segments, tips of tibiae and tarsi darker, sometimes black. Rarely specimens have irregular dark spots on the thorax. Length 5-6 mm.

Specimens examined are from:

Duval Co., Florida, W. H. Ashmead (type).

Langdon, Mo., Aug. 28, 1901, H. G. Barber.

Clarendon Siding, Kans., July 26, 1891.

Horace, Kans., July 28, 1891.

Wades, Tex., May 22, E. A. Schwarz; Dallas, Tex., Sept. 8, 1906, Sept. 23, 1911; Brewster Co., Tex., June 13-17, 1908.

San Antonio, Tex., H. Osborn. All specimens to this point in National Collection.

St. Petersburg, Fla., April 28, 1908, E. P. Van Duzee. Paratype of *Jalysus perclavatus* in collection of E. P. Van Duzee.

Citations in the synonymy indicate that the systematic position of this species has been the subject of controversy. The original description was poor and the original generic reference to *Hoplinus* Stal inexcusable. At the same time it must be said that Stal's description of *Hoplinus*<sup>1</sup> is very generalized and by no means fits the insect he makes the genotype, namely *Neides spinosissimus* Signoret.<sup>2</sup> The latter is described as having a large number of spines on head,

<sup>1</sup> Stal, C., Enumeratio Hemipterorum, 4, 1874, p. 127.

<sup>2</sup> Signoret, V., Revision des Hemipteres du Chile, Ann. Soc. Ent. de France, 4th Ser., Vol. 3, 1863, p. 555.

thorax and elytra, with a score for instance along the outer border of each elytron.

With respect to this latter point Stal misread the original description and by inserting in his generic diagnosis "margin of abdomen spinose" has misled others. What Signoret really says in the original description is: "Elytra having on the longitudinal veins of the corium and along the outer margin a large number of spines; with respect to the latter one observes, at least a score which, viewing the insect from above, appear to pertain to the abdomen, but which in reality belong to the outer border of the elytra."

The connexivum, therefore, is unarmed, not long-spinose as stated by Van Duzee<sup>3</sup> in his remarks objecting to Barber's allocation<sup>4</sup> in *Jalysus* of Ashmead's *Hoplinus multispinus*.

Let us take Ashmead's description in connection with the type specimen which is still in existence and see whether the species is identifiable. The original description is herewith reproduced:

"Length .20 inch. Pale yellowish brown, tarsi and terminal antennal joint, black. Head armed with three spines, one median on a line with base of antennæ, prominent but blunt, and one on each side just back of antennæ. There is a prominent acute spine at base of scutellum, two short sharp spines at tip of abdomen, and one on each pleura, extending and slightly curving over at base of elytra. Prothorax long, narrowed before, more than twice the length of the width at base, punctured, with a slight median carina, the narrow transverse portion just before the middle impunctured. The legs are long and thin, the posterior femora reaching beyond the tip of the abdomen."

Discussing this description, it must be admitted at once that the notes on color and structure of the antennæ, thorax and legs bring out nothing to prevent the insect being considered a *Jalysus* (as heretofore understood). There remains as a bone of contention, only the spines. Ashmead misunderstood or gave little heed to the characters of *Hoplinus* as derived from the description of the genotype, and subsequent writers have scarcely improved upon his attitude. In his description of *multispinus* Ashmead's statement that there is a spine

<sup>3</sup> Can. Ent., Nov., 1914, p. 381.

<sup>4</sup> JOURN. N. Y. ENT. SOC., 19, 1911, p. 24.

[the ostiolar tubercle] on each pleura, extending [to] and slightly curving over at base of elytra, indicate that the insect before him was a *Jalysus*, unless indeed we divide that genus, as here done.

The two short, sharp spines at tip of abdomen are merely the acute angles of the broadly emarginate terminal segments. The scutellar spine is characteristic of *Jalysus*, and the prominent but blunt spine between bases of antennæ marks the species under consideration, whether we call it *multispinus* or *perclavatus*.

There remains but one difficulty, and that the only real one in harmonizing Ashmead's species with the genus *Jalysus* (as heretofore understood) and identifying it with *J. perclavatus* Van D. This is the alleged presence of a spine on each side of head just back of antenna. In my opinion Ashmead described the antenna from a single entire one, and the "spine" from the broken base of the other. There is present on the type such a broken base which might be mistaken for a spine.

A poor piece of work, admittedly, but when has this fault been given weight in discussions of nomenclatorial matters? If it were, hundreds of names now accepted would go by the board, and even the foundation of all our nomenclature would be shattered, for judged by present standards the definitions of Linnæus are very indiscriminating. Ashmead's chief fault in launching his *multispinus* was one still too common, namely that of trying to stretch the definition of an existing genus to cover the new form in hand, regardless of violence done.

This case emphasizes an aspect of the description of new forms that is seldom dwelt upon. That is, credit and honor for a discovery are not the most important things connected with naming a new group. On the contrary, it must be borne in mind that responsibility for launching the new form or group and for adequately characterizing it is great, and that this phase of the work cannot be slighted without detriment to science and to the good standing of the describer. Thus under the workings of priority rulings, although imperfect and unworthy work seemingly is elevated, poetic justice is done by making the authors of poor, insincere or pirated work responsible for all of their discreditable brood. Every subsequent author who works over their product sees its faults, and the fact that an individual's name follows a long list of names of organisms by no



means indicates a glorious position in the galaxy of science; it may be just the reverse. In taxonomic work as elsewhere quality counts.

**Aknisus calvus** new species.

This species has the same type of ostiolar process as *A. multispinus*, with which, chiefly on that account, it is associated in a new genus. The present species is similar to *A. multispinus* throughout except that front of vertex is smoothly rounded over, there being no indication of a frontal tubercle. Length 6-7 mm.

Two specimens in National Collection, one from Modesto, Calif., March 31-April 1, 1910, H. Osborn, and one from Lindsay, Calif., July 13, 1909, W. A. Davidson, of which the former is the type.

**Jalysus** Stal.

*Jalysus* Stal, C. Bidrag till Rio Janeiro-Traktens. Hemipter-Fauna, Pt. 2, 1862, p. 59. [Included species, *sobrinus*, *tenellus* and *macer* Stal; the latter is the genotype.]

Front of vertex with or without spine;<sup>5</sup> thorax with distinct callosities; sides and median line very low carinate and area within humeri elevated; scutellum with short, sharp, posteriorly inclined spine; elytra spineless, corium not conspicuously punctate; ostiolar process shorter, less curved, and not twisted, canal entirely on the outer side, apex of process a rather long spine; beak nearly or quite attaining hind coxæ; no indication of rostral position on underside of head; sulcus beginning at middle of prosternum, narrow and shallow between fore coxæ; much widened on mesosternum, flanked on each side by 5-6 indentations, abruptly contracted as it passes between middle coxæ, then widened again on metasternum, but not attaining width of part anterior to coxæ, the whole meso- and metasternal parts of sulcus with distinct, carinate edges; sulcus fairly well developed on first abdominal segment, percurrent, with broad flat longitudinally wrinkled margins.

KEY TO THE SPECIES.

- Front of vertex with a long, sharp, sometimes decurved spine; scutellar spine depressed, almost horizontal ..... **elongatus** Barber.  
 Front of vertex without spines, scutellar spine inclined at an angle of 45 degrees ..... **spinosus** Say.

<sup>5</sup> The front of vertex in *Jalysus* exhibits considerable variation in structure, which, however, has not been found to be related to the place of collection of specimens, or otherwise available for taxonomic purposes.

***Jalysus elongatus* Barber.**

*Jalysus elongatus* Barber, H. G., JOURN. N. Y. ENT. SOC., Vol. 19, No. 1, March, 1911, pp. 23-24 [Huachuca Mts., Ariz.].

This species is light buff in color, with only the eyes, terminal antennal joints and tarsi dark. The median line and edges of pronotum are slightly raised, calloused and pale. Pronotum rather more elevated within humeral angles than in *J. spinosus*, abdomen considerably surpassing wings. Length 8 mm.

One specimen examined, a paratype, from Huachuca Mts., Ariz., July 8, 1905, H. G. Barber (U. S. Nat. Mus.).

***Jalysus spinosus* Say.**

*Berytus spinosus* Say, Thomas. American Entomology, Vol. I, 1824, pp. 28-9.

The complete writings of Thomas Say on the Entomology of North America, Vol. 1, 1859, pp. 28-9. [No locality mentioned.]

This species is distinguished from all others in the United States by having the ostiolar process tipped with a distinct spine.

General color, yellow-brown, with last antennal joint except its base and apex, eyes, apex of corium, tips of tarsi, and sometimes irregular spots on thorax, and longitudinal vittæ on venter, fuscous to black. Length 7-9 mm.

Inhabits Eastern North America from Louisiana and Florida north to Ontario and Quebec.

***Jalysus spinosus* subspecies *wickhami* Van Duzee.**

*Jalysus wickhami* Van Duzee, E. P. New North American Heteroptera, Ent. News., Dec., 1906, pp. 387-8. [Inyo Mts., Calif., Tucson, Ariz.]

From Nebraska and Texas to British Columbia and California occurs a race of *Jalysus spinosus*, for which the name *wickhami* is available. This form usually is of slighter stature than the eastern subspecies; the ostiolar process is shorter and its terminal spine less conspicuous; the front of vertex is more prominent, often forming a distinct tubercle; and the terminal antennal joint is noticeably shorter. Perhaps any of these characters may be observed in an occasional eastern specimen, but in combination they characterize western representatives of the species and justify their recognition as a geographical race, or subspecies.

Through the kindness of Mr. E. P. Van Duzee a paratype of this form from the Inyo Mts., Calif., has been examined.

**Neides** Latreille.

*Neides* Latreille, P. A. Histoire Naturelle, générale et particulière des Crustacés et des Insectes, III, 1802, p. 246. [Examples: *Gerris stipularius* Linnaeus; *clavipes* Fabricius, the former later selected as type.]

Head with vertex produced into a pointed process strongly deflexed over front; thorax without spines, the margins and median line more or less carinate and slightly elevated behind; scutellum without spine; elytra without spines, clavus and corium strongly punctate; ostiolar canal gently curved posteriorly, broader toward apex, which is only slightly tuberculate; beak nearly or quite reaching middle coxæ; underside of head not grooved, but position of beak marked off by a heavy line of coarse hair-like pollinosity, which margins the whole rostral sulcus and spreads more or less over the whole pectus; rostral sulcus narrow, faint on prosternum, deep and most distinct on mesosternum, constricted between and behind middle coxæ, expanding again at posterior border of metasternum; on first abdominal segment short, shallow and evanescent posteriorly.

**Neides muticus** Say.

*Berytus muticus* Say, Thomas. Descriptions of new species of Heteropterous Hemiptera of North America. New Harmony, Ind., Dec., 1831, p. 13. Complete Writings, Vol. 1, 1859, p. 328. [Northwest Territory.]

*Neides gracilipes* Stal, C. Hemiptera Species novas descripsit. Kongliga Svenska Fregatten Eugenies Resa Omkrin Jörden, I. Insecta, pp. 235-6, 1859. [San Francisco, Calif.]

*Neides decurvatus* Uhler, P. R. Notices of some Heteroptera in the collection of Dr. T. W. Harris. Proc. Boston Soc. Nat. Hist., XIV, p. 100, 1871. [Dublin, N. H.] Type examined.

To the generic description, it is only necessary to add that this species is stramineous in general color, with terminal antennal joints, eyes, underside of thorax, tips of tibiæ and tarsi darker, sometimes black. Length 8-10 mm.

*Neides muticus* ranges from Quebec and British Columbia south to New Jersey, in the mountains to Georgia, and to Ohio, Kansas, Arizona and California. A specimen in the National Collection is labelled Duval Co., Fla., but this record would seem to need corroboration.

**Protacanthus** Uhler.

*Protacanthus* Uhler, P. R. A list of the Hemiptera-Heteroptera collected in the Island of St. Vincent by Mr. Herbert H. Smith: with Descriptions of

New Genera and Species. Proc. Zoöl. Soc. London, pp. 707-8, Nov. 21, 1893. [Monobasic, *P. decorus* n. sp. genotype, p. 708.]

Head rotund, smooth, shining; thorax: anterior margin raised in a ridge which is produced at each side into a straight nearly upright spine; sides and median line low carinate; humeral angles and end of median carina slightly prominent; scutellum with a long, curved slightly retrorse spine; elytra entirely hyaline without spines; ostiolar canal rather strongly curved posteriorly then anteriorly near apex, which from above appears as a short, abruptly pointed tubercle. Poor condition of material prevents descriptions of beak and rostral sulcus.

**Protacanthus decorus** Uhler.

*Protacanthus decorus* Uhler, P. R. Citation as under genus, p. 708. [St. Vincent Id., West Indies.]

*Metacanthus capitatus* Uhler, P. R. On the Hemiptera-Heteroptera of the Island of Grenada. Proc. Zoöl. Soc. Lond., p. 181, March 6, 1894. [Grenada.]

*Metacanthus decorus* Distant, W. L. Rhynchotal Notes, IX. Heteroptera: Fam. Coreidæ. The Annals and Magazine of Natural History, 7th Ser., Vol. 7, p. 430, May, 1901.

Uhler's description of this species in two different genera in successive years is hard to understand. Notwithstanding his later assignment of the species to the genus *Metacanthus*, supported by similar action by Distant, if we can rely on Fieber's description<sup>6</sup> of that genus, this species does not belong to it. I have been unable to consult the original description of *Metacanthus* by Costa.<sup>7</sup>

To the generic description it need only be added that this species is stramineous in general color, most of the head, and terminal antennal joints being black, and the femora spotted, the tibiæ banded and the tarsi tipped with fuscous to black. Length 4 mm.

Occurs in southern Florida.

**Pronotacantha** Uhler.

*Pronotacantha* Uhler, P. R. Hemiptera-Heteroptera of the Death Valley Expedition. N. A. Fauna, No. 7, 1893, p. 260. [Monobasic, *P. annulata* n. sp., pp. 260-1, genotype.]

Head rotund, polished, with a single short, rounded protuberance or caruncle at middle of vertex; thorax with about 17 strong, curved

<sup>6</sup> Fieber, F. X., Die Familie der Berytidae, Wiener Ent. Monats., III, No. 7, July, 1859, p. 209. Die europäischen Hemiptera, pp. 213-4, 1860.

<sup>7</sup> Atti Acad. Napoli, 1848, p. 258.

spines, the tendency of which is to point away from center; only 2 on anterior lobe; front margin of thorax with 7 small ovoid caruncles; scutellum with a very long curved retrorse spine; entire elytra hyaline, without spines; ostiole small, on summit of a rounded conical tubercle; beak extending between hind coxæ; rostral sulcus distinct on prosternum, but shallow, broad with swollen margins on mesosternum, constricted between middle coxæ, expanded on metasternum, shallow, almost flat; of same nature on first abdominal segment, evanescent posteriorly.

**Pronotacantha annulata** Uhler.

*Pronotacantha annulata* Uhler, P. R. Citation as under genus, pp. 260-1. [Argus Mts., Calif.; Ariz.]

In this species the caruncles and spines are pale, the latter sometimes dark-tipped; the head is black, also the thorax except for anterior half of posterior lobe; the elytra stramineous hyaline with faint brownish clouds, and the abdomen stramineous to reddish; antennæ and legs copiously brownish annulate (bands over expanded portions broader), terminal joint of former and tarsi mostly blackish. Length 2.5-4 mm.

Specimens examined are from Williams, Ashfork, Hot Springs, Flagstaff, Bright Angel, Tuscon, and the Galiuro and Huachucha Mts., Ariz., from Mesilla Park, N. Mex., Palm Springs, and Argus Mts., Calif. (the latter the type).

**Saurocoris** new genus.

Head with 5 antrorse curved spines along median line, decreasing in size anteriorly, the foremost projecting horizontally over base of beak; knobs and spinules elsewhere, a prominent one behind each antenna; low, interrupted carinæ behind the above eyes; thorax with slender spines on front, lateral margins, and in three lines (one the median carina) on disk, all antrorsely directed except those on hind part of posterior lobe which are either erect or retrorse; mesosternum greatly swollen, mesothorax in general with only fine punctures, sides of head and pleuræ with few or no spines; scutellum with a single, straight, sharp, slender, retrorsely inclined spine; median vein of clavus and all veins of corium with numerous short, curved retrorse spines; juncture of marginal and terminal veins of corium far cepha-

lad of end of abdomen; membrane ample without spines, delicate, hyaline; ostiole minute, at apex of short recurved, rather blunt ostiolar process; beak somewhat surpassing middle coxæ; rostral sulcus first evident on mesosternum where it is broad, rather shallow and bounded by the tumid lateral portions of the sclerite, narrowed between middle coxæ, then almost regaining its width on metasternum, deep, distinctly margined; broader, rather deep and definitely margined on first abdominal segment; venter with rows of tubercles and small spines across segments.

Genotype, *Saurocoris instans* new species.

**Saurocoris instans** new species.

Structural characters as noted in keys and in description of genus. General color stramineous, some specimens almost wholly so, others with head except antennal insertions, and region back of ocelli and anterior lobe of thorax except disk, black; antennæ and legs copiously annulate (bands over expanded portions broader) with fuscous to black; terminal joint of former and tarsi black; venter stramineous. Length 3-3½ mm.

Nymphs, apparently in the last instar have the antennæ and legs marked as in adults, the general color shining reddish stramineous. The median series of large spines on head is about as in adult, but remainder of head and upper surface with numerous round tipped spines, in strong rows across dorsal surface of abdomen.

Type from California, probably Los Angeles Co., collected by D. W. Coquillett. Other specimens are from that county, April (nymphs and adult); and Folsom, Calif., July 8, 1885. All in U. S. National Museum.

#### **Acanthophysa** Uhler.

*Acanthophysa* Uhler, P. R. Hemiptera-Heteroptera of the Death Valley Expedition. N. A. Fauna, No. 7, 1893, p. 261. [Monobasic, *A. echinata* n. sp., p. 261, genotype.]

Head with five antrorse curved spines along median line, decreasing in size anteriorly, the foremost strongly projecting over base of beak; tubercles and spinules elsewhere, a prominent one behind each antenna, and low, continuous carinæ both behind and above eyes; thorax with strong spines on front and lateral margins and in three lines on disk, the tendency of all the spines being to project away from the center; mesosternum not at all swollen, mesothorax very coarsely punctured; sides of head, basal joint of beak and pleuræ more or less bristly spinose; scutellum with a long, sharp,

curved spine; median vein of clavus and all veins of corium beset with numerous strong, curved retrorse spines; juncture of marginal and terminal veins of corium almost over end of abdomen; membrane reduced to a narrow strip along inner side of wide, inflated corium and forming a curved acuminate terminal appendage with three raised veins; ostiolar process tubular, slightly curved posteriorly, obliquely truncate; venter with many rows of bristled tubercles; beak almost or quite attaining hind coxæ; rostral sulcus scarcely evident on prosternum, deep, in some cases, almost pit-like on mesosternum, narrowed between middle coxæ, then almost regaining its anterior width and depth on metasternum, broader and shallower on first abdominal segment; with distinct raised margin throughout.

***Acanthophysa echinata* Uhler.**

*Acanthophysa echinata* Uhler, P. R. Citation as under genus. [Argus Mts. and Los Angeles, Calif.]

General color stramineous, spines more yellowish; antennæ indistinctly brownish annulate, terminal joint black; femora indistinctly spotted, the enlarged apex covered by a broad fuscous band; tibiæ annulate, tarsi mostly dark. Length 3-4 mm.

Specimens examined are from San Bernardino and Argus Mts. (the type), Calif., and Las Vegas, Hot Springs, N. Mex.

A specimen from Los Angeles Co., Calif., has the elytra proportionally narrower than in the typical form and the membrane a trifle more developed though retaining the characteristic shape. This specimen differs from all the others also in having the dark markings very distinct, resembling in this respect the preceding species.

It is barely possible that *Saurocoris instans* is the macropterous state of *Acanthophysa echinata*, but until this is demonstrated by field or breeding studies, I prefer to treat the forms as here done. The present arrangement is justified by the characters of the specimens at hand, and the other course could only be taken by guess. Risking possible creation of synonyms, which can easily be assigned to their proper places when the whole truth is known, is better than publishing misidentifications which once established in the literature are almost ineradicable.

The true characters of the genus *Hoplinus* Stal ascertained from the description of the type species *Neides spinosissimus* Signoret

(see discussion, pp. 82, 83) indicate that genus to be very closely related to *Acanthophysa* and *Saurocoris*. It is possible that one or the other [or both as suggested above] may prove to be synonyms of *Hoplinus*. The original description of the genotype, although good, does not give the information necessary to decide the matter. It is worth pointing out with respect to this possible identity of Chilean and Californian genera that examples of similar geographic distribution are not lacking. Several species of plants, for instance, are known to be common to the western coast regions of North and South America.

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## COLEOPTERA COLLECTED AT COCHRANE, NORTHERN ONTARIO, AUGUST 22-30, 1918, WITH DESCRIPTIONS OF SIX NEW SPECIES.

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

### CICINDELIDÆ.

- Cicindela longilabris* Say. 6 specimens.  
*Cicindela limbalis* Klug. 2 specimens.  
*Cicindela tranquebarica* Hbst. 52 specimens.  
*Cicindela 12-guttata* Dej. 24 specimens.

### CARABIDÆ.

- Nomarectus bilobus* Say. 1 specimen.  
*Elaphrus ruscarius* Say. 1 specimen.  
*Notiophilus semistriatus* Say. 1 specimen.  
*Dyschirius œneolus* Lec. 6 specimens.  
*Bembidium nitidum* Kby. 14 specimens.  
*Bembidium concolor* Kby. 1 specimen.  
*Bembidium bimaculatum* Kby. 1 specimen.  
*Bembidium scopulinum* Kby. 53 specimens.  
*Bembidium grapei* Gyll. 37 specimens.  
*Bembidium lengi* n. sp. 1 specimen.  
*Bembidium nigripes* Kby. 47 specimens.  
*Bembidium versicolor* Lec. 24 specimens.



- Bembidium anguliferum* Lec. 2 specimens.  
*Bembidium mutatum* G. & H. 10 specimens.  
*Tachys nanus* Gyll. 6 specimens.  
*Trechus chalybeus* Mann. 3 specimens.  
*Pterostichus punctatissimus* Rand. 3 specimens.  
*Pterostichus lucublandus* Say. 2 specimens.  
*Pterostichus orinumum* Leach. 6 specimens.  
*Pterostichus luzotii* Dej. 37 specimens.  
*Pterostichus patruelis* Dej. 12 specimens.  
*Amara apricaria* Payk. 7 specimens.  
*Amara fallax* Lec. 31 specimens.  
*Amara erratica* Sturm. 17 specimens.  
*Amara interstitialis* Dej. 10 specimens.  
*Amara remotestriata* Dej. 17 specimens.  
*Amara subænca* Lec. 33 specimens.  
*Calathus ingratus* Dej. 9 specimens.  
*Platynus sinuatus* Dej. 2 specimens.  
*Platynus cupripennis* Say. 5 specimens.  
*Platynus bogemanni* Gyll. 1 specimen.  
*Platynus quadripunctatus* DeG. 4 specimens.  
*Platynus picicornis* Lec. 1 specimen.  
*Platynus ruficornis* Lec. 1 specimen.  
*Cymindis cribricollis* Dej. 1 specimen.  
*Miscodera arctica* Payk. 7 specimens.  
*Agonoderus pauperculus* Dej. 1 specimen.  
*Harpalus viridicæneus* Beauv. 3 specimens.  
*Anisodactylus baltimorensis* Say. 1 specimen.

## HALIPLIDÆ.

- Haliplus borealis* Lec. 46 specimens.

## DYTISCIDÆ.

- Laccophilus inconspicuus* Fall. 15 specimens.  
*Bidessus affinis* Say. 26 specimens.  
*Calanibus inæqualis* Fabr. 14 specimens.  
*Calambus suturalis* Lec. 8 specimens.  
*Calambus impressopunctatus* Sch. 2 specimens.  
*Hydroporus morio* Sharp. 13 specimens.

- Hydroporus tristis* Payk. 14 specimens.  
*Hydroporus tenebrosus* Lec. 2 specimens.  
*Hydroporus niger* Sharp. 2 specimens.  
*Hydroporus arcticus* Thoms. 4 specimens.  
*Hydroporus stagnalis* G. & H. 36 specimens.  
*Ilybius pleuriticus* Lec. 4 specimens.  
*Agabus seriatus* Say. 2 specimens.  
*Agabus anthracinus* Mann. 5 specimens.  
*Agabus infuscatus* Aubé. 1 specimen.  
*Rhantus binotatus* Harr. 39 specimens.  
*Rhantus bistriatus* Bergst. 18 specimens.  
*Colymbetes sculptilis* Harr. 2 specimens.  
*Dytiscus dauricus* Gebl. 3 specimens.  
*Acilius semisulcatus* Aubé. 14 specimens.

## GYRINIDÆ.

- Gyrinus picipes* Aubé. 15 specimens.

## HYDROPHILIDÆ.

- Helophorus nitidulus* Lec. 18 specimens.  
*Helophorus linearis* Lec. 1 specimen.  
*Helophorus lineatus* Say. 5 specimens.  
*Helophorus inquinatus* Mann. 3 specimens.  
*Ochthebius foveicollis* Lec. 1 specimen.  
*Hydræna pennsylvanica* Kies. 18 specimens.  
*Laccobius agilis* Rand. 8 specimens.  
*Philhydrus hamiltoni* Horn. 31 specimens.  
*Cymbiodyta lacustris* Lec. 13 specimens.  
*Hydrobius fuscipes* Linn. 1 specimen.  
*Creniphilus digestus* Lec. 17 specimens.  
*Creniphilus subcupreus* Say. 3 specimens.

## SILPHIDÆ.

- Necrophorus sayi* Lap. 1 specimen.  
*Silpha surinamensis* Fabr. 3 specimens.  
*Choleva luridipennis* Mann. 1 specimen.  
*Choleva terminans* Lec. 1 specimen.  
*Colon clavatum* Mäkl. 1 specimen.  
*Colon elongatum* n. sp. 1 specimen.

*Hydnobijs substriatus* Lec. 2 specimens.

*Anisotoma assimilis* Lec. 3 specimens.

*Clambus puberulus* Lec. 1 specimen.

#### STAPHYLINIDÆ.

*Colpodota aterrima* Grav. 1 specimen. (A European species not hitherto reported from North America.)

*Colpodota parva* Sahl. 46 specimens.

*Atheta virginica* Brnh. 13 specimens.

*Atheta nigrifulva* Grav. 74 specimens.

*Atheta euryptera* Steph. 1 specimen.

*Aloconota sulcifrons* Steph. 1 specimen.

*Alcochara bipustulata* Linn. 2 specimens.

*Oxypoda lividipennis* Mann. 5 specimens.

*Gyrophana lobata* Csy. 17 specimens.

*Quedius fulgidus* Fabr. 1 specimen.

*Quedius molochinus* Grav. 6 specimens.

*Quedius hyperboreus* Erichs. 1 specimen.

*Philonthus lomatus* Erich. 1 specimen.

*Philonthus nigrifulvus* Grav. 2 specimens.

*Xantholinus cephalus* Say. 2 specimens.

*Stenus bipunctatus* Erich. 19 specimens.

*Stenus austini* Csy. 1 specimen.

*Stenus corvus* Csy. 2 specimens.

*Stenus colonus* Erich. 2 specimens.

*Stenus obtrusus* Csy. 2 specimens.

*Stenus hubbardi* Csy. 2 specimens.

*Euæsthetus americanus* Erich. 1 specimen.

*Lathrobium tenebrosus* n. sp. 1 specimen.

*Lathrobium humile* n. sp. 3 specimens.

*Scopæus linearis* n. sp. 3 specimens.

*Tachinus memnonius* Grav. 5 specimens.

*Tachinus instabilis* Mäkl. 2 specimens.

*Tachyporus jocosus* Say. 6 specimens.

*Conosoma littoreum* Linn. 1 specimen.

*Mycetoporus lepidus* Erichs. 1 specimen.

*Geodromicus brunneus* Say. 5 specimens.

*Olophrum consimilis* Gyll. 3 specimens (new to North American Lists).

- Phlæxonomus lapponicus* Zetter. 3 specimens.  
*Homalium foraminosum* Mäkl. 1 specimen.  
*Acrolocha diffusa* Fauv. 52 specimens.  
*Protinus limbatus* Mäkl. 33 specimens.  
*Megarthus angulicollis* Mäkl. 1 specimen.

## TRICHOPTERYGIDÆ.

- Ptinella qucroi* Lec. 9 specimens.  
*Ptenidium ulkei* Matth. 2 specimens.

## SCAPHIDIIDÆ.

- Scaphium castanipes* Kby. 1 specimen.  
*Scaphisoma convexa* Say. 3 specimens.

## COCCINELLIDÆ.

- Anisosticta strigata* Thunb. 3 specimens.  
*Coccinella transversoguttata* Fald. 1 specimen.  
*Coccinella trifasciata* Linn. 2 specimens.

## HISTERIDÆ.

- Hister lecontei* Mars. 1 specimen.

## NITIDULIDÆ.

- Epurca ornatula* n. sp. 1 specimen.  
*Omosita colon* Linn. 16 specimens.  
*Ips bipunctatus* Mels. 2 specimens.

## LATHRIDIIDÆ.

- Corticaria valida* Fall. 1 specimen.  
*Corticaria dentigera* Lec. 1 specimen.  
*Corticaria serrata* Payk. 1 specimen.  
*Melanophthalma picta* Lec. 1 specimen.  
*Melanophthalma americana* Mann. 3 specimens.

## BYRRHIDÆ.

- Simplocaria tessellata* Lec. 1 specimen.  
*Porcinolus murinus* Fabr. 1 specimen.

## DASCYLLIDÆ.

*Cyphon variabilis* Thunb. 2 specimens.

## ELATERIDÆ.

*Corymbetes virens* Schr. 1 specimen.

## LAMPYRIDÆ.

*Ellychnia corrusca* Linn. 7 specimens.

## CLERIDÆ.

*Necrobia violacea* Linn. 1 specimen.

## SCARABÆIDÆ.

*Trichius affinis* Gory. 1 specimen.

*Aphodius fimetarius* Linn. 1 specimen.

## CERAMBYCIDÆ.

*Criocephalus agrestis* Kby. 1 specimen.

*Acmæops proteus* Kby. 1 specimen.

*Monohammus scutellatus* Say. 2 specimens.

*Pogonocherus mixtus* Hald. 1 specimen.

## CHRYSOMELIDÆ.

*Calligrapha elegans* Oliv. 1 specimen.

*Gastroidea polygoni* Linn. 1 specimen.

*Trirhabda flavolimbata* Mann. 9 specimens.

*Galerucella decora* Say. 1 specimen.

*Hypolamphis pilosa* Ill. 3 specimens.

*Haltica ignita* Ill. 3 specimens.

*Crepidodera robusta* Lec. 1 specimen.

*Chatocnema irregularis* Lec. 1 specimen.

## TENEBRIONIDÆ.

*Upis ceramboides* Linn. 1 specimen.

## PYTHIDÆ.

*Salpingus virescens* Lec. 1 specimen.

## CURCULIONIDÆ.

*Orchestes rufipes* Lec. 17 specimens.

*Rhinoncus pyrrhopus* Boh. 1 specimen.

## DESCRIPTIONS OF NEW SPECIES.

***Bembidium lengi*** new species.

Form oblong, slightly elongate, feebly convex; color dark nigro-æneous tinged with green, shining, the elytra dark brown with a small, indistinct spot on the third interval about one third from the base, an angulate band just behind the middle and a subapical area blackish, color paler between the latter marks forming a more or less distinct pale angulate band one third from the apex; palpi, basal joint of the antennæ and legs reddish brown. Head and thorax alutaceous, the latter smooth at the middle; head slightly wider than the thorax at apex, the latter rather convex, subquadrate, less than one half wider than long, as wide at base as apex, apex truncate, median line impressed and slightly dilated, abbreviated before and behind, transverse impressions distinct, basal impressions broad, bistriate, all impressions rugose; sides with the margin very narrowly reflexed, arcuate in front and sinuate behind, hind angles subrectangular, strongly carinate. Elytra distinctly wider than the thorax, oblong ovate, striæ entire, impressed, strongly punctate, more finely behind the middle; intervals convex, the third with the first dorsal puncture about one third from the base, the second two fifths from the apex. Beneath black shining. Length 4.75-5.5 mm., breadth 1.75-2.15 mm.; one male, Cochrane, Ont.; six males, four females, Ausable Lakes, Essex Co., N. Y.

This species belongs in the group XII *variegatum* of Mr. Hayward's synopsis and resembles closely *B. indistinctum* Dej., from which it may be distinguished by its more strongly convex thorax with median line impressed and slightly dilated and sides more strongly arcuate and sinuate and by the impressed and more coarsely punctured elytral striæ. I take pleasure in naming this interesting species for Mr. C. W. Leng, who has given me much assistance in the study of beetles.

***Colon elongatum*** new species.

Oblong, slightly elongate, not broader in front, dark piceous brown, head and thorax darker, feebly shining, rather coarsely but not densely pubescent. Head rather densely punctured. Antennæ slightly passing the middle of the thorax, basal joints not paler, club rather stout, five-jointed, terminal joint broadly rounded at tip, but not obtuse. Thorax about one fourth wider than long, sides arcuate, rather strongly narrowed at one fourth from the base, base truncate, hind angles obtuse and narrowly rounded, shining, densely muricate-punctate. Elytra as wide at base as thorax, widest near the middle somewhat broadly rounded behind, sutural striæ fainter near the base, punc-

tured like the thorax. Abdomen densely and finely punctured; metasternum more sparsely and coarsely. Length 2.4 mm., width 1 mm. (one male).

Mannerheim's description of *clavatum* requires elytra widest at the base and thence gradually narrowed to apex. Horn states that the hind tarsi are filiform in *inermis* Mann. and compressed in *clavatum* Mann., a character not given in the original descriptions. He also states that the hind tarsi are nearly as long as the tibiae in *inermis*, but shorter in *clavatum*. In the specimen listed above as *clavatum* and the one described as *elongatum*, the hind tarsi are equally long and strongly compressed, but in *clavatum* they are a third thicker vertically. In *clavatum* the thorax is scarcely at all narrowed near the base and the elytra are widest at the base, the pubescence finer and the color much paler and more reddish. *Inermis* Mann. and *clavatum* Mann. are the species most closely allied to *elongatum*.

**Lathrobium tenebrosum** new species.

Elongate, rather slender, slightly depressed, parallel, dark and uniform piceous in color throughout, the legs and antennae rufous, surface shining; head quadrate, as long as wide, sides scarcely arcuate, hind angles rather narrowly rounded, base truncate, coarsely and sparsely punctured, more finely and closely behind, gular sutures moderately separated and converging posteriorly about one third; antennae rather short and stout; second and third joints one half longer than wide, four to ten subequal as wide as long, much rounded, last joint as long as the second, acute at apex. Neck one half the width of the head; prothorax one third longer than wide, scarcely wider than the head, very slightly narrowed behind, sides feebly arcuate, angles somewhat rounded, punctures coarse and deep, median smooth line rather narrow and entire; elytra scarcely longer than the prothorax on the lateral margin and scarcely wider at the apex, conjointly rather deeply emarginate, sides diverging very slightly posteriorly and nearly straight, punctures coarse and indistinct, surface subrugose; abdomen slightly wider to the fourth segment thence more strongly narrowed to the apex, punctures minute, dense and subasperate (one female).

Male.—Unknown.

Female.—The sixth segment strongly lobed, lobe as long as the segment and at the apex two fifths as wide as the segment, sides strongly converging posteriorly and tip very obtusely rounded; fifth segment at middle on posterior margin and lobe at middle just visibly flattened. Length 6.5 mm., width 1 mm.

Close to *picescens* Csy., but differing slightly in the proportions of the thorax and elytra and in the form of the sixth segment in the female.

**Lathrobium humile** new species.

Elongate, parallel, rather slender, color dark piceous, legs and antennæ rufo-piceous, tarsi and terminal joint of the antennæ paler. Head one fourth longer than wide; eyes small, distant from the hind margin two and one half times their diameter, sides of head slightly narrowed posteriorly and moderately arcuate, base truncate, hind angles rounded, gular sutures moderately separated, straight and parallel, genæ somewhat convex. Head finely and indistinctly punctate; gula impunctate. Antennæ about one fourth longer than the head, joints two-six about one fourth longer than wide, seven-ten as wide as long, terminal joint longer than wide, acutely pointed; third joint of maxillary palpi strongly inflated, terminal very small slender and retractile. Neck one third as wide as the head. Prothorax very slightly narrower than the head, one half longer than wide, sides parallel, angles strongly rounded; more coarsely and distinctly punctate than the head, median smooth line rather narrow and indefinite, but entire. Elytra as wide as head and as long as the prothorax, conjointly very slightly emarginate at apex, without epipleural plications, finely, rather sparsely and indistinctly punctate, subrugose. Abdomen as wide at base as the elytra, slightly wider to the fifth segment, thence more strongly narrowed to the apex, very finely, densely punctate and pubescent. Legs rather slender, hind tarsi two thirds the length of the tibiæ, joint one very slightly longer than two, three and four shorter, subequal, five as long as two, three and four together, front tarsi strongly dilated. Length 3.1 mm., width .4-.5 mm. (One male, two females.)

Male.—Sixth segment deeply triangularly emarginate; emargination one half the width of the segment, acute and equilateral, outer angles rounded, a distinct median impression behind the emargination; fifth segment flattened at apex and transversely impressed at base; fourth, third and second segments with larger foveate impressions, first slightly flattened and foveate at apex.

Female.—Sixth segment broadly rounded at apex.

This species cannot be placed in any of the divisions of *Lathrobium* as defined by Casey, but comes nearest to *Tetartopeus*, from which it differs in its parallel form and inflated maxillary palpi.

**Scopæus linearis** new species.

Elongate, very slender, parallel, piceous-black, legs and antennæ rufo-piceous, tarsi and outer antennal joints paler. Head one third longer than wide, eyes small, distant three times their diameters from the base, sides arcuate and narrowed to the base, hind angles nearly obliterated—male; less narrowed, angles more distinct—female; labrum acutely notched at middle, lobes very obliquely truncate with two long, slender teeth on each; antennæ nearly as long as the head and prothorax, rather slender; first joint long, clavate; second slightly elongate and thicker than the following; third as long as the second; four-six very slightly elongate; seven-ten as wide as long; last joint slightly longer than wide and acute. Third joint of the maxillary palpi moderately inflated, last joint very small and retracted, gular sutures



narrowly separated, genæ moderately convex; head rather finely, closely and somewhat indistinctly punctured above and beneath. Neck very slender. Prothorax as wide as the head, one fourth longer than wide, oval, all the angles obliterated, convex, finely and densely punctate and pubescent throughout; prosternum rather long in front of the coxæ, simple, very shining and impunctate. Elytra one fifth wider than the prothorax and one fourth longer, conjointly very slightly emarginate, finely, closely, subrugosely punctate and finely pubescent throughout. Abdomen nearly as wide as the elytra at base, slightly wider to the fifth segment, thence more strongly narrowed to the apex; first three dorsal segments transversely impressed at base, very finely and densely punctate and pubescent throughout. Legs slender, tibiæ slightly thicker at apex with outer angles obliquely truncate; tarsi two thirds the length of the tibiæ, first joint longer, two-four subequal about as long as wide, last joint equal in length to the two preceding. Length 3-3.4 mm., width .4-.5 mm. (one male, two females).

Male.—Fourth ventral segment faintly impressed at middle; fifth segment with two strong teeth at the posterior margin separated by one third the width of the segment and projecting posteriorly, equal in length to slightly less than one half the width of the segment; the teeth are arcuate, concave within, the inner edge continuous with the edges of a triangular impression on the middle of the segment, the impression is acute at the posterior margin and deepest at the anterior margin between the bases of the teeth, where the segment is emarginate; the depth of the emargination is equal to one third width of the segment and projecting posteriorly, equal in length to slightly less than one half the width of the segment; the teeth are arcuate, concave within, the inner edge continuous with the edges of a triangular impression on the middle of the segment, the impression is acute at the posterior margin and deepest at the anterior margin between the bases of the teeth, where the segment is emarginate; the depth of the emargination is equal to one third the width of the segment; its basal margin is straight and transverse and bears a short, pointed tooth on the median line which projects upward and backward and is slightly bent downward at the extreme tip. The sixth segment is triangularly emarginate; the emargination is as broad as long and equal in depth to one half the width of the segment; its apex and outer angles are rounded; the seventh segment is elongate, acutely triangularly cleft to the base.



Ventral abdominal segments of *Scolopus linearis*, male.

Female.—Sixth segment broadly rounded at apex.

This species seems closely allied to *S. brunnipes* Lec., but differs in the form of the abdominal modifications of the male as described by Casey.

***Epuræa ornatula* new species.**

Oblong, slightly elongate, somewhat convex, rufo-testaceous, sparsely clothed with minute yellowish pubescence, scarcely shining; head closely but somewhat indistinctly punctured, front convex with distinct impressions. Antennæ rufo-testaceous, club piceous, third joint twice as long as wide, one third longer than the fourth, fourth and fifth of equal length, six, seven and eight shorter. Thorax one half wider than long, narrowed in front, sides moderately arcuate from apex to one third from the base, thence obliquely narrowed to the posterior angles which are obtuse, distinct, but finely rounded. There is a faint sinuation before the angulations at one third and before the posterior angles. The sides of the prothorax are widely explanate with the margins narrowly but strongly reflexed, especially at and before the middle; the anterior margin is strongly emarginate and the angles prominent though obtuse and rounded; the punctuation is indistinct. The elytra are scarcely broader than the prothorax, and twice as long, scarcely wider at the middle, thence narrowed to the apices which are broadly rounded, side margins rather widely reflexed; punctures rather coarse, close and distinct throughout. Underside as coarsely and closely but not so distinctly punctured. Intercoxal process of the abdomen narrow and triangularly acute. Length 2.25 mm., width 1 mm. (one male).

Male.—Additional abdominal segment, middle tibiæ faintly sinuate on the inner edge and strongly dilated at tip.

This species seems distinct from *E. borcela* Zett. its closest ally, by its smaller size, color and form.

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## REVIEW.

*A Revision of the Vespidae of the Belgian Congo based on the Collection of the American Museum Congo Expedition, with a List of Ethiopian Diplopterous Wasps.* By J. BEQUAERT. Bulletin of the Amer. Mus. of Nat. History, 1918, 39: 1-384, vi pl. (2 col.), illust.

Abundantly qualified, by reason of several years' field experience in the Belgian Congo and other parts of Africa, a portion of that time in association with Messrs. Lang and Chapin in the expedition referred to in the title, as well as by an intimate knowledge of the diplopterous wasps, Dr. Joseph Bequaert has published a memoir, which, not by reason of its subject matter or its comprehensiveness, but rather by the masterly way in which that subject matter is dealt with, and by the keen taxonomic perception and sound judgment which that treatment manifests, raises its author indubitably to the very front rank of this world hymenopterists. Indeed, it sets a taxo-

onomic standard for this order which has been undeniably equalled by myrmecologists, but rarely by the students of other families, except possibly by one to whom, by reason of his nationality, it is at present a less pleasant duty to pay tribute, the late Franz Friederick Kohl.

The subject matter is more comprehensive than the title of the memoir would imply. Not only in its characteristics as a whole, but genus by genus the Ethiopian fauna is placed in relation to that of other regions, especially as regards the structural characteristics of the African species. The elaboration of excellent structural characteristics for the separation of the species of the various genera of the Belgian Congo will doubtless be a stimulus and a great help to similar work in other regions. The ethology of these wasps, embracing as they do both solitary and social as well as transitional forms, is of a great deal of interest, and Dr. Bequaert not only makes noteworthy contributions to this field, but summarises in connection with each group what is already known.

The general features of the taxonomy mark a decided step in advance in the classification of these wasps, and are in distinct contrast to the somewhat slovenly and ill-digested classifications of Ashmead and Dalle Torre. Dr. Bequaert includes in his family Vespidae not only the social wasps, but also those solitary and semi-solitary species more often classed as Eumenidae and Masaridae. None of the latter come within the Belgian Congo and consequently there is not much said about them. The remaining Vespidae he divides into eight subfamilies, the extent, distribution characters and ethology of which are expressed in the adjoining table, which I have thought it worth while to draw up from the facts as he states them.

The Raphiglossinae are a small group transitional between the masarid groups and the diploptera. They are undoubtedly the most generalized of the families tabulated. Dr. Bequaert suggests that *Gayella* may not belong with this group, and in this I am confident that he is correct. The Zethinae and Eumeninae, comprising most of the old family Eumenidae, together contain 75 per cent. of the species and 50 per cent. of the genera of the world of these eight subfamilies. They are both composed of solitary wasps, but each contain species exhibiting development toward social or at least communistic life.

The Stenogastrinae are a connecting link between the solitary and

the social wasps. They are paper wasps, making open combs, with some of the species solitary, others social.

The remaining subfamilies are the true social wasps, the largest and far the most diversified generically being the Epiponinae, a tropical group, best developed in South America. The Ropalidiinae are confined to the tropics of the old world. The Polistinae, comprising almost exclusively species of the genus *Polistes*, are cosmopolitan. The Vespinae, belonging almost entirely to the genus *Vespa*, are absent from the neotropical, and except for an invading oriental species and a dubious east coast form are also absent from the Ethiopian. The last subfamily, most highly developed of all from an ethological standpoint, is sharply differentiated from the rest morphologically by the absence of an anal lobe in the hind wing, and by the incised anal area thereof, making the wing almost stalked.

Compared with other tropical regions, and especially the Neotropical, Dr. Bequaert finds the Vespid fauna of the Ethiopian region meager. Especially is this true of the social wasps. As the latter are of the greatest interest to entomologists in general, it may be worth while to summarise his account of those groups in Africa.

Omitting the genus *Vespa*, which is hardly an intrinsic part, the Ethiopian fauna contains only four genera of social Vespidae, belonging to three subfamilies.

*Belonogaster* (Epiponinae), with its thirty-five African species, is second largest of these genera, and is almost exclusively Ethiopian. A nest of wasps of this genus, an open comb of a single layer, is shown by well reproduced photographs. Mr. Lang's description of the process of nest building is of interest: "The building of the cells is done by means of the front legs and the mandibles. The vegetable fibers are mixed with saliva and kneaded between the mandibles; from time to time the paste is rolled between the front legs. This process goes on until the fiber paste is of a uniform, soft consistency; then the wasp applies the paper to the cells and models it into the right position and shape, going over it and over it again with the mandibles. The adults touch the young with their legs, whereupon the latter at once extend their heads to receive food; at the same time they secrete from the mouth a fluid which is absorbed by the adult wasps." This last observation is of interest in connection with the

theory recently advanced by Dr. Wheeler<sup>1</sup> and by E. Roubaud<sup>2</sup> to the effect that the origin of social habits of insects may be traced to the secretion by the larvæ of fluids eagerly sought after by the adults. Dr. Bequaert questions whether the conditions of social life of *Belonogaster*, the absence of true workers, etc., are very primitive, as thought by Roubaud, or are degenerate. A curious and interesting habit of these wasps is that of gnawing away discarded portions of the nest and reutilizing the material to build new parts.

*Polybioides* (Epiponinæ), of which there are two species, are the only African wasps that enclose their comb in an outer paper envelope. The comb is vertical, several parallel layers hanging within the envelope. These are the only Vespidæ that normally utilize both sides of the comb to build cells, as does the honey-bee. The nests of both species are illustrated by excellent photographs. These wasps are very bellicose, and are uncomfortably prominent features of the Congo region. The nests may reach three feet in length.

The Ropalidiinæ are represented by the genus *Ropalidia* [= *Icaria*] which, with its forty-one species, is the largest of the four genera in Africa. However, only twelve of these inhabit the mainland, the others being found in Madagascar. It builds open combs resembling those of *Polistes*. Some of the species are very common. These three genera are all restricted to the Ethiopian and Oriental, or in the case of *Ropalidia* also Australian regions. The fourth genus of social wasps is the cosmopolitan *Polistes*, which is well represented.

The large number of species of subfamily Eumeninæ (1,900 from all regions) form a dominant, plastic group, and, like all such groups which are undergoing active evolution at present, are peculiarly difficult to deal with taxonomically. Dr. Bequaert's discussion of the characters and variation within this group, and his arrangement, for comparison, of the species of *Odynerus* and *Synagris* in color groups are illuminating.

The exclusively African genus *Synagris* is one of the largest, most common, and by reason of their large size and brilliant color,

<sup>1</sup> A Study of some Ant Larvæ, with a Consideration of the Origin and Meaning of the Social Habit among Insects. By William Morton Wheeler. Proceedings of the American Philosophical Society, 1918, 57: 293-343.

<sup>2</sup> Recherches biologiques sur les guêpes solitaires et sociales d'Afrique. Ann. Sc. Nat. Zool., 1916 (10), 1: 1-160.

TABLE TO THE SUBFAMILIES OF VESPINÆ (EXCEPT

Subfamily.	No. of Genera.	No. of Species.	No. of Species.					Solitary or Social?	Monogynous or Polygynous?	No. of Castes.	Nature of Nest.	Second Cubital Cell Receiving 1 or 2 Recurrent Veins?
			Palaearctic.	Ethiopian.	Oriental and Australian.	Nearctic.	Neotropical.					
Raphiglossinæ	4	14	8	4	—	—	2	Solitary.	—	2	—	1
Zethinæ . . . . .	11	217	4	27	36	2	157	Solitary, tendency toward communism.	—	2	—	2
Eumeninæ . . . . .	22	1,900	337	338	513	223	488	Solitary, progression toward social.	—	2	—	2
Stenogastrinæ	1	30	—	—	30	—	—	Solitary or social.	?	?	Open comb.	2
Epiponinæ . . . . .	22	170	—	37	10	2	122	Social.	Monogynous, or polygynous.	2 or 3	Open or enclosed comb.	2
Rhopalidiinæ . . . . .	3	132	—	41	91	—	—	Social.	Often polygynous.	—	Single open comb.	2
Polistinæ . . . . .	2	153	6	21	64	15	51	Social.	Usually monogynous.	3	Single open comb.	2
Vespinæ . . . . .	2	53	16 (2)	30	13	—	—	Social.	Monogynous.	3	Multiple enclosed comb.	2

the most striking of African solitary diploptera. The author shows that certain of the segments of the palpi are ordinarily shed with the pupal envelopes. *Synagris cornuta* has normally very large horn-like growths on the mandibles of the male, but series show all stages of reduction to mere tubercles. One of the two excellent colored plates shows eight named color-varieties of this species.

## MASARINÆ AND EUPARAGINÆ) ACCORDING TO DR. BEQUAERT.

Anal Lobe.	Cubital Cells.	Tarsal Claws.	No. of Apical Spurs on the Middle Tibiæ.	Valvula Receiving Extensory Muscle of Abdomen.	Clypeus.	Mandibles.
Present.	Irregular unequal.	Bifid.	1 or 2.		Rounded, truncate, emarginate.	Short and broad; closing beneath the clypeus; apices toothed.
Present.	Irregular unequal.	Bifid.	1 or 2.		Rounded, truncate, emarginate.	Short, obliquely truncate; folding under the clypeus; apices toothed.
Present.	Irregular unequal.	Bifid, toothed or rarely simple.	1, rarely 2 or 0.		Rounded, truncate, emarginate, rarely pointed.	Elongate, crossing in an X or parallel; closing over tip of clypeus.
Present.	Large rectangular, equal.	Too hed.	2.		Projecting in rounded or sharp point.	Slender, often elongate, toothed on inner margin in ♀, or in ♂ and ♀.
Present.	Irregular unequal.	Simple.	2, rarely 1.	Oval.	As long as broad; apex pointed or bidentate; rarely longer than broad and truncate.	Short and broad; apical margin truncate and toothed; folding over each other under clypeus.
Present.	Irregular unequal.	Simple.	2.	Narrowly compressed.	Broader than long; feebly pointed or rounded.	Short and broad; apex truncate and sharply toothed; folding over each other under tip of clypeus.
Present.	Irregular unequal.	Simple.	2.	Narrow and much compressed.	Ending in a point, rounded or truncate.	Short, quadrate; apices truncate and sharply toothed; folding over each other beneath the clypeus.
Absent.	Irregular unequal.	Simple.	2.		Truncate at apex which is feebly emarginate or ends on 2 lateral teeth.	Short, broad, apex truncate and sharply toothed; closing over each other beneath clypeus.

The author describes an elaborate mite-chamber at the base of the second dorsal segment of *Nortonia bisuturalis*, and in connection therewith he gives an account of mite-chambers in Hymenoptera in general, recounting amongst others, two or three North American species in which he has observed them.

Numerous excellent text-figures of anatomical parts, by the author, and maps of distribution add to the value of the work.

The paper closes with a full reference catalogue of the species of Vespidae of the entire Ethiopian region.—J. CHESTER BRADLEY.

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### MISCELLANEOUS NOTES.

**Tibicen inauditus.**—This cicada was described and figured in the JOURNAL OF THE N. Y. ENTOMOLOGICAL SOCIETY for December, 1917, from the type and two other males collected west of Vega, Oldham County, Texas, July 15, 1917. Miss Mildred McGill has sent me a fourth male collected in the same county at Tascosa, Texas, June 25, 1918.—W. T. DAVIS.

**Dorcasta obtusa.**—This beetle is described by Henry W. Bates in Biologia Centrali-Americana, Coleoptera, V, p. 372, from Cerro de Plumas, Mexico (Höge), and Mirandilla, Guatemala (Champion). The insect is figured on Tab. 23 (Coleoptera), fig. 1. On May 1, 1912, the writer collected a single example of this species at South Bay, Lake Okeechobee, Florida, which appears to be the first specimen known from the United States, and, according to Mr. Leng's recollection of an unnamed specimen in the Gundlach collection in Havana, occurs also in Cuba. In Mexico, Central America, and South America there are a number of other species belonging to the genus.—WM. T. DAVIS.

**The Males of the Roach, Pycnoscelus surinamensis.**—In his excellent paper on the Blattidae of North America Mr. Morgan Hebard has this to say concerning desirable field work and the Surinam cockroach as found in North America: "To find if this insect is parthenogenetic in America; nearly four hundred females have been recorded from this continent, but no males." On page 196 he states further: "In addition to the large series from the United States, we have examined nearly two hundred specimens of this species, chiefly from the West Indies and Mexico, without finding a single male, adult or immature, from the American continent." He further quotes from Brunner, who had males from the East Indies, but "states that not a single male was present in his series of over forty specimens from tropical America."



After reading these statements I carefully examined my own collection and found that the sixty-six adults collected at La Grange, Miami, Key West, Everglade, Mt. Myers and Punta Gorda, Florida, were in every case females, as were also two from Guantanamo in Cuba. However, among seven adults collected in the Reptile House of the New York Zoölogical Society on January 12, 1914, I discovered a single male, easily told by its smaller body and longer cerci. These roaches, together with many *Periplaneta americana*, were found among the straw in the winter quarters of the giant land turtles.

It is well known that among some of our native roaches the females long outlive the males, and it is quite possible that the males of the Surinam roach occur in very early spring in southern Florida.—WM. T. DAVIS.

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## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF DECEMBER 3.

A regular meeting of the New York Entomological Society was held at 8:15 P.M., December 3, 1918, in the American Museum of Natural History; President L. B. Woodruff in the chair, with eighteen members and three visitors present, including Prof. O. P. Medsger, of the Torrey Botanical Club.

Mr. L. B. Reyonlds, 11 Ellsworth Ave., Brockton, Mass., and Sergt. W. B. Richardson, Richmond, Va., were elected active members.

Mr. Davis spoke with regret of the death of Frederick Knab, reading some extracts from a letter of his executor, A. N. Caudell, relative to the dispersal of his ashes by wind in the woods.

Mr. Dickerson read for Mr. Weiss a paper on "Some Beetles from Rose Mallow," illustrated by specimens of the beetles and their work in the plant and as far as possible by larvæ and pupæ. The paper will be printed under the joint authorship of Messrs. Weiss and Dickerson.

Mr. Leng spoke of the dubious identity of *Chatocnema* they had found on the leaves, probably a variety of *quadricollis* Sz. described from Florida.

Mr. Shoemaker exhibited a large number of "Lepidoptera from Slide Mountain," saying that he had visited the locality for the last three years and mentioning many of the valuable captures he had made at sugar; also the *Cychnus viduus* found in the same way.

Mr. Davis exhibited six boxes of Lepidoptera captured while with Mr. Shoemaker in June and with Dr. Bequaert and Mr. Engelhardt in September and a number of photographs of the locality. He read from his journal

notes made at the time, which showed how he and Mr. Shoemaker had sugared until midnight. The moths that were so plentiful in June were nearly absent in September, but more butterflies were found, often attracted by urine on the road. Mr. Davis noted that of the June noctuids many were in the first part of the list, the September species coming later in the list as well as in the season; and spoke also of the generic changes in Lepidoptera due to proper recognition of Hübner's names. He closed by suggesting a correction in Lovell's book, "The Flower and the Bee," where it is said that lilies with inverted blossoms are not fertilized by Lepidoptera, based upon specimens of *Papilio* he exhibited with their wings heavily coated with pollen of *Lilium superbum*. These had been caught by Mr. Burns on Staten Island and by himself at Yaphank.

Mr. Woodruff spoke of the abundance and tameness of the deer near Fancher's, where he had met Messrs. Davis and Engelhardt, also of the bear and other animals.

Mr. Engelhardt spoke of the great difference in the summits of the various Catskill Mountains.

Mr. Medsger, director of nature study in boys' camps in the Catskills, who was present as a visitor, also exhibited Lepidoptera caught in his tent during July and August, and spoke of meeting Mr. Dow and of the botany of the Catskills, describing particularly the deep moss to be found on the steep face of Slide, Wittenberg and Cornell Mts. The last, reached conveniently from Woodland, Ulster Co., N. Y., was especially recommended on account of the stand of virgin red spruce on the summit.

Mr. Mutchler exhibited a series of *Sobarus poggei* Harold, an African prionide collected by Lang & Chapin, commenting upon the exceptional character of its red bands, the subfamily to which it belongs being generally devoid of brilliant colors.

#### MEETING OF DECEMBER 17.

A regular meeting of the New York Entomological Society was held at 8:15 P.M., December 17, 1918, in the American Museum of Natural History, Mr. Wm. T. Davis, chairman pro tem., with twenty members and three visitors present.

A letter from Lieut. W. J. Chamberlin, 91st Aëro Squadron, France, was read.

Dr. Lutz read a "Review of Comstock's System of Wing Venation," illustrated by blackboard sketches, in which the development of a uniform terminology, the studies of various authors in the wings of nymphs and pupæ as well as adults and the relation between the tracheation and venation were explained. The primitive type of wing was sketched and the process of evolution stated. In conclusion Dr. Lutz expressed his admiration of the result from the point of view of comparative anatomy, but doubted its immediate universal acceptance as a taxonomic system on account of the necessarily cumbersome formulæ it involved in designating the wings of highly specialized insects.

His remarks were discussed by Messrs. Olsen, Halinan, Davis and Engelhardt.

Mr. Weiss read a paper on "Lepidopterous Insects found on Hibiscus," which will be printed in full. The adults, larvæ and work of each species were shown.

Mr. Doll, present as a visitor, spoke of the larvæ of *Acontia delecta* as very abundant at Arlington, N. J., but heavily parasitized; and of the method employed by his friend, Mr. Rummel, to collect larvæ of *Apanthesis* by heaping together boards, etc., as traps.

Mr. Engelhardt said he believed the larvæ of *Acontia delecta* were nocturnal feeders, because though seldom seen on bright days, they were numerous in the same locality when the day became overcast.

Mr. Dickerson read a paper on "Miscellaneous Insects found on Hibiscus," covering the galls, plant lice, leaf hoppers, beetles, bees and ants found on the plant during the long period he and Mr. Weiss had it under observation. His illustration included the specimens they had caught.

Dr. Lutz expressed his admiration of the work of Messrs. Weiss and Dickerson on hibiscus insects and his appreciation of the value of special work of such character.

Mr. Olsen spoke of Dr. Brittain's leaf-hopper papers and Mr. Davis exhibited Dr. Felt's "Key to American Insect Galls" in connection with Mr. Dickerson's paper.

Mr. Jones exhibited five boxes of Lepidoptera that he had collected during the year, giving a brief account of his journey through southern Arizona in April and California in May, June and July, ending with a trip to Alaska and homeward journey through the Canadian Rocky Mountains. He said that butterflies were so plentiful in Plumas County, Calif., where he stayed two months to study pitcher plant fauna, that he caught sixty species in the first two weeks and eighty species in all. The case-bearing moths captured were of great interest because all were rare in collections and several previously known by unique examples. Mr. Jones showed also examples of *Parnassius* taken at 7,000 ft. elevation, where they were abundant, and many photographs.

Mr. Davis commented on the beautiful exhibit of rare butterflies and upon Mr. Jones having also taken the time to catch cicadas for him.

Mr. Engelhardt presented a photograph of the home of Dr. Fenyès and suggested the propriety of obtaining a portrait of that distinguished coleopterist.

#### MEETING OF JANUARY 7.

A regular meeting of the New York Entomological Society was held at 8 P.M., January 7, 1919, in the American Museum of Natural History, President L. B. Woodruff in the chair, with twenty members and five visitors present.

The curator reported that work on the Local Collection had progressed in Homoptera, thanks to Mr. Olsen.

Mr. Hall, under the title "Miscellaneous Notes on Maine Butterflies,"

exhibited specimens he had taken at West Baldwin and Mt. Desert, Maine, and commented on their distribution, etc. Among the species shown were *Fenesica tarquinius*, *Debis portlandia*, very abundant at West Baldwin, *Grafta J-album*, *Blygonia comma*, *Arcyanis alope*, of which the *nephele* form was rare at West Baldwin, but more common with a complete set of intermediate forms at Mt. Desert. *Thecla calamis* and *edwardsi*, *Eurymus philodice* and *interior* (with its form *laurentica*) *Argynnis atlantis*. He called attention also to the fact that all the specimens were set on flat boards. His remarks were discussed by Mr. Davis, who recalled finding *Fenesica tarquinius* common at Wingina, Va.; Mr. Woodruff, who found it along alder-lined streams, and Mr. Engelhardt, who spoke of a colony in Prospect Park, on alders infested by cottony scale. He said he had found the pupæ in crevices of the bark or among the fallen leaves, their presence being indicated by the ragged appearance of the eaten scale.

In reference to mounting on flat boards, Mr. Davis recalled the success Mr. Pearsall had in mounting geometers in that way.

In reference to *Debis portlandia*, Mr. Notman spoke of its habit of flying indoors in the Adirondacks, and several members gave their experience in finding it a shade-loving butterfly.

Mr. H. B. Weiss read a paper on "Life History and Early Stages of *Brachys*, *ovata* and *arosa*," illustrated by leaves showing its feeding and larval cells; also by specimens of larvæ and adults. This paper will be printed as joint product of Weiss and Nicolay.

Mr. Davis spoke of *Brachys* on turkey oak in Florida, which pupated in the leaf and of Mr. Manee's mention of the rattling noise caused by the insect moving within the cell in North Carolina, which he also had heard in Florida. Subsequent to the meeting, the following references to the records of the rattling noise made by *Brachys* larvæ or pupæ in oak leaves were found, viz.: Leng, JOURN. N. Y. ENT. SOC., XX, 1912, p. 193; Davis, JOURN. N. Y. ENT. SOC., XX, 1912, p. 305; op. cit., XXII, 1914, p. 267. A reëxamination of the specimen which pupated within the leaf showed it to be *B. tessellata* Fab., placed heretofore as a variety of *B. ovata*, but possibly a distinct species. It should also be said that it is *B. tessellata* that is common at Southern Pine, N. C., where Mr. Manee's observations were made.

Mr. Groth recalled the meeting at Mrs. Slosson's house when the JOURNAL was started and the changes that had taken place in the Society since. After serving the Society as treasurer and president, other duties had prevented his recent regular attendance, but his interest was not lessened and found expression in training boy scouts in entomology.

Mr. Engelhardt said that eye troubles prevented Mr. Doll speaking on "Raising Larvæ in Utah," but having been Mr. Doll's companion he could testify to his industry in that direction and success under trying conditions, which including carrying the breeding cages on horseback. It was difficult to find larvæ in the desert regions of Utah, but two specimens of *Clisio-campa*, shown to be different by breeding, a few Sphingids and Catocalas,

*Morumba modesta* form *occidentalis*, hatched after their return and *Melitæa minuta* were among his successful efforts.

Mrs. E. Robertson Miller, present as a visitor, spoke of the pleasure she found in interesting children in outdoor things and the good entomologists that resulted. Her book on water insects had been delayed by her serious auto accident, but she hoped would soon be printed to tell of the pleasures of watching their growth hour by hour.

Mr. Halinan exhibited several boxes of insects from Tofo, Chile, and remarked upon their similarity to what we get here in semi-arid country. From the Guaymas River in Ecuador to 26° S. Lat. there is no vegetation except where small rivers fed by melting snow or springs cause an oasis. It was in such an oasis that he made most of his captures.

Mr. Notman exhibited a specimen of *Harpalus fulvilabris* Mann. found at 2,900 feet elevation in the Adirondacks and remarked upon its rarity and the two ocellate subsutural punctures on each elytron, one fifth from apex.

Dr. Bequaert exhibited three rare insects acquired during his visit to Boston.

Mr. Davis exhibited *Dorcasta obtusa* Bates, of which he had taken a specimen May 1, 1912, at South Bay, Lake Okeechobee, Fla. This long-horn is new to our fauna; it is known from Mexico and Central America.

Mr. Davis also exhibited specimens of *Tibicen inauditus* and *Pycnoscelus surinamensis*; his remarks in reference thereto will be found in Miscellaneous Notes.

#### MEETING OF JANUARY 21.

A regular meeting of the New York Entomological Society was held at 8 P.M., January 21, 1919, in the American Museum of Natural History, President L. B. Woodruff in the chair, with fourteen members and three visitors present.

The curator reported donations to the Local Collection by Mr. Weiss.

Mr. Antoine M. Gaudin, 29 West 91st St., New York City, and Mr. Hiram V. Lawrence, 599 Bedford Ave., Brooklyn, N. Y., were elected active members.

Letters from Lieut. W. J. Chamberlin and Dr. A. Fenyes were read. Mr. Woodruff opened the "Symposium on Legs of Insects" by reading a paper on the legs of dragon flies. Discussion by Messrs. Weiss, Davis, Schaeffer, Bequaert and Notman followed, bringing out the fact that the front legs assist to some extent in capturing prey.

Mr. Leng read a paper on legs of beetles, which was discussed by Dr. Bequaert and Messrs. Schaeffer and Olsen.

Mr. Notman read a paper on legs of Carabidæ, devoted to interesting details of neglected features.

Mr. Davis read a paper on legs of Orthoptera, illustrated by specimens, which was discussed by Dr. Bequaert, who pointed out that the elongate coxæ were found also in the raptorial legs of Diptera; and that the exceptional characters of aquatic Gryllidæ were noteworthy.

Owing to the late hour, the remainder of the papers were postponed to the meeting of February 18.

Mr. W. P. Van Duzee, present as a visitor, spoke of the ornamented tibia and tarsus in the dipterous genus *Dolichopus*, where the femora are always a little flattened and usually clothed with black hair; if, however, the femora are in large part yellow, the hairs also are yellow. In some species the lower edge is glabrous and the lower row of hairs elongate, like a black fringe. In one species there is a bristle on hind femora near tip, with the usual hairs omitted in a glabrous space following.

Mr. E. A. Chapin, also present as a visitor, spoke of the legs of fleas, which he said exhibited great similarity, though the tibial bristles, sometimes longer than the tarsus, the very large coxa (longer than femur), the method of attachment in the high trochanter, and other peculiarities were of interest.

#### MEETING OF FEBRUARY 4.

A regular meeting of the New York Entomological Society was held at 8 P.M. February 4, 1919, in the American Museum of Natural History, President L. B. Woodruff in the chair, with nineteen members and Prof. H. C. Fall present as a visitor.

Letters from Mr. Dow were read by Messrs. Leng and Davis.

Mr. Woodruff read a paper, "Fall Notes on Alabama Butterflies," illustrated by four boxes of specimens.

Messrs. Davis, Lutz and Shoemaker corroborated his statements in regard to migration of *Catopsilia cubule* and recalled the communications of Mr. Shannon on migration.

Dr. Bequaert read a "Review of Rau's 'Wasp Stories Afield,'" praising highly their care in obtaining correct identifications, patience in lengthened observation and conciseness while with Col. Robinson at Wingina, Va., as an instance of wasps going to a distance for suitable pebbles to use as pounding tool.

Dr. Lutz recalled Dr. Williston's early notice of wasp's use of tool. Dr. Lutz exhibited casts of burrows of tiger beetle and wasp made by Mr. Wunder under his direction and pointed out the advantages of the method. Two methods were used: (1) The earth around the burrow was hardened by pouring glue or shellac down the hole; the burrow was then dug out; (2) an excavation was made in such a way that a cross section of the burrow was exposed on one face of the excavation; a plaster cast was then made of that face. This plaster cast could be used as an accurate note concerning the burrow, or, using it as a mold, it is frequently possible to get a plaster reproduction of the cross section of the burrow. Of these two methods, the second is the better.

Dr. Lutz also exhibited winged ant clinging to leg of the *Microbembex* that had captured it as an instance of the latter using live as well as dead insects.

Mr. Watson read a paper on "The Egg of *Polistes cernes* Boisd. & Lec.," illustrated by blackboard drawings.

Mr. Davis read a paper on a remarkable nest of *Vespa maculata* and the number of queens of *Polistes* that sometimes combine their efforts in nest building.

All the papers referred to will be printed elsewhere.

Prof. H. C. Fall, present as a visitor, spoke of the entomologists of the Pacific Coast and of his work in progress on the genus *Gyrinus*, especially in regard to the number of species that are sometimes associated in a single school.

Mr. Nicolay spoke of his six months' experience as a member of the American Expeditionary Force in France. His being stationed for a time at Bligny on billet duty had permitted of his making some collections of French Carabidæ.





# THE NEW YORK ENTOMOLOGICAL SOCIETY.

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Annual dues for Active Members, \$3.00.

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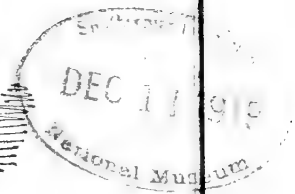
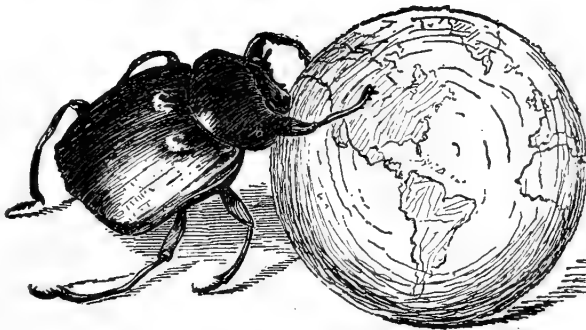
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## NEW YORK

# Entomological Society.

Devoted to Entomology in General.



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# JOURNAL

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### NOTES ON THE PLUSIINÆ, WITH DESCRIPTIONS OF NEW SPECIES AND RACES.

BY RODRIGUES OTTOLENGUI,

NEW YORK CITY.

In 1902 it was my privilege to publish a brief monograph of this group, accompanied by illustrations of fifty-eight species.<sup>1</sup> These illustrations were half tone reproductions from photographs of the insects themselves. None but those that have tried to do this, know how difficult and how unsatisfactory it is, if one aims to produce perfect results. In the hope of having the wings in perfect focus, the specimens were freshly mounted shortly before photographing. To avoid shadows, tiny bits of cork were pasted on glass and the specimens pinned in place, the transparent glass thus avoiding a background that would receive shadows. The photographs were good, but far from perfect, and when the half tone plates were made, and then printed the results left much to be desired, I myself finding it difficult to determine some closely allied species from the illustrations alone. It has not surprised me therefore to find some of the species then described as new, and figured, still proving to be confusing to even good entomologists.

During the past five years, therefore, I have been engaged in pre-

<sup>1</sup> See JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, Vol. X, pp. 56-77.

paring data and illustrations for a new and more complete monograph. It has been, and still is, my hope to publish a complete set of figures in color, of all the species indigenous to Boreal North America.

That this work might be complete I obtained through the courtesy of Sir George Hampson, and with the assistance of his artist, color drawings of the thirty-six types in the British Museum collection. Since then I have had similar color drawings made for me by Mrs. Beutenmüller, of all species in my own collection, and of several types to be found in museum collections, and at present I have figures of nearly every North American species; indeed we have two or even three figures of several species which vary considerably.

Recently I have obtained estimates for the reproduction of those extremely interesting and accurate drawings, by the four color process, but the prices asked at this time are prohibitive, and consequently I must forego, at least for the present, the satisfaction of publishing in color.

During the past five years however I have had the kindly assistance of several ardent collectors, who have obtained for me several new species or forms, and have courteously granted me the privilege of retaining primary types. To these gentlemen I have returned paratype specimens and it is to authenticate these names, already distributed in various collections, that I have concluded to publish at this time, at least enough in the way of descriptions to satisfy the rules. To this end I present herewith a half-tone plate, made from Mrs. Beutenmüller's colored drawings, and will now append sufficient descriptions so that, together with the figures, the forms may be recognized. I desire to add however that it is my intention in the near future to publish complete detailed, comparative descriptions of all those figured herewith, as well as of others.

A problem that has engaged much of my time and study arose from the fact that Sir George Hampson in his Catalogue of the British Museum (Vol. XIII) described and figured both *Autographa Sackeni* and *Autographa Snowi*. He lists these as "*Syngrapha*" and at this time I shall not discuss his generic separation of this group, but, as I am considering American forms, I shall follow the latest American Check List, Barnes and McDonnough.

I copy from Hampson's synoptic table.<sup>2</sup>

- a<sup>1</sup> Forewing with orbicular absent, the U-shaped stigma somewhat pointed  
below ..... *Sackeni*.  
b<sup>2</sup> Forewing with orbicular present, U-shaped stigma rounded below.. *Snowi*.

In the plate of colored figures accompanying the volume, it appeared to me that the figures labeled *Snowi*, more closely resembled *Sackeni*. I so wrote to my friend, that excellent student of the noctuidæ, Mr. F. H. Wolley Dod, who was at the time stationed near London. He kindly visited the British Museum and wrote me that the figures agreed with the museum specimens, and he added that he never had been able to distinguish between *Snowi* and *Sackeni* until Sir George Hampson pointed out the above distinctions.

This proved more puzzling than ever because I have specimens which are undoubtedly *Sackeni*, and which nevertheless agree with both sets of requirements as stated in the synoptic table, the orbicular being sometimes present and sometimes absent, and the sign far from constant.

Then Mr. K. Bowman, of Edmonton, Alberta, sent me some specimens for identification, and among these I found a new form, very close to *Sackeni*. Turning to Hampson's descriptions of *Sackeni* (pp. 417-418) and *Snowi* (pp. 418-419) we find that in his museum he has the type of *Sackeni*, a male, and two females, all from Colorado, which is the type locality. But his description of *Snowi* was based on two specimens, a female from Calgary, Alberta, and a female from Athabasca, B. C., whereas *Snowi* was described from a specimen taken near Las Vegas, New Mexico. This fact led me to suspect that what Dod and Hampson have been identifying as *Snowi*, might really be this new form discovered by Mr. Bowman. This suspicion has been confirmed by Mr. Bowman's sending a specimen to Sir George Hampson who returned it labeled "*Snowi*." Since then I have a letter from Sir George Hampson from which I quote as follows:

"I had specimens sent me not long ago from Nordegg, Alberta, of what I called in my Catalogue, *Syngrapha Snowi*, on the authority of Wolley Dod, and I was informed that you considered this a new species. I do not know the typical Colorado and New Mexico form, so have no means of judging."

<sup>2</sup> Cat. Brit. Mus., Vol. XII, p. 413.

This finally determines the fact that Hampson's description does not apply to *Snowi*, whereas it does very accurately describe this Canadian species, for which I herewith propose the name *diversigna*, because of the fact that the sign is exceedingly variable.

A few words now in regard to *Snowi*. I know of but two absolutely authentic examples of this species, and both are before me as I write, and are figured herewith. Several museum collections have specimens labeled "*Snowi*" but they are always from Colorado. Bruce and others have distributed a Colorado form under this name, some of which I have readily recognized as *Sackeni*, while a few have been quite puzzling, a question arising as to whether the brownish color had been the true color or whether it was due to the age of the specimen. Of course it is possible that this species may exist in Colorado, and I have myself two or three of Bruce's specimens about which I have not yet fully decided.

The two authentic specimens of *Snowi* to which I have alluded, are, first a specimen loaned me by the University of Kansas which acquired Prof. Snow's collection. This specimen carries a printed "TYPE" label, but no manuscript label in Edward's hand. The locality label reads: "Near Hot Springs, Las Vegas, N. M., 7000 ft., July, '82. F. H. Snow." (See Plate XV, fig. 3.)

The second specimen is one presented by Prof. Snow to Mr. Cramer, passing from him into the possession of Mr. Jacob Doll, and from Mr. Doll to myself. This carries a printed locality label the exact facsimile of the other except that the date is "Aug., 82."

In Edwards's description of *Snowi*<sup>3</sup> he does not state the date of capture of the single specimen of *Snowi* from which he described his species, but on same page he describes *Heliothis suavis*, taken by Prof. Snow at the same locality, Aug., 1882, which at least indicates that Prof. Snow was collecting in that locality in August as well as in July, 1882, the date on the supposed "type" of *Snowi*. I raise this point because I am of the opinion that the July specimen is not the true type, being 35 mm. in expanse, whereas Edwards tells us that his type expands 30 mm., which is exactly the expanse of my August, 1882, specimen. It therefore seems at least credible that the labels were accidentally exchanged and that Prof. Snow really let Mr. Cramer have the true type. Moreover, the description fits the

<sup>3</sup> Papilio, 1884, Vol. 4, p. 44.



smaller specimen better than it does the larger one, especially as to the sign. However that may be, one of these two specimens is probably the type and the following descriptions are based upon them.

From these two authentic specimens of *Snowi*, fifteen specimens of *Sackeni* from various mountains in Colorado, and nine specimens of *diversigna* taken at Nordegg, Alberta, by Mr. Bowman, and one specimen received some years ago from Mr. Bean taken at Laggan, I append the following brief descriptions which point out the main characters by which the three species may be separated.

**Snowi.** Rich brown of reddish tint.

**Sackeni.** Purplish brown.

**diversigna.** Brownish purple.

**Snowi.** The space between the basal line and the A.T. line is brown, concolorous above and below the median vein. "At base of costa is an obscure orange streak, bordered with brown."

**Sackeni.** The space between the basal line and the A.T. line is mainly yellowish above the median vein, and brownish below. The basal line and the A.T. line meet on the costa, the latter passing, sharply oblique, downward and then inward. The space between the two lines, and above the vein is more or less filled in with yellowish, and when completely filled forms a distinct sagitate mark. This character, however, is variable.

**diversigna.** The space between the basal line and the A.T. line is concolorous above and below the median vein, slightly olivaceous. The A.T. line begins on the costa distinctly separate from the basal line.

As a further distinguishing characterization I quote the following from an incomplete manuscript description of *diversigna*.

**Autographa diversigna** new species.

The primaries are mainly brownish purple, profusely speckled with microscopic dots, giving the wing, especially in the lighter shades, a reticulated appearance. The median space below the cell is filled with chocolate brown, darkest near the sign and showing the reticulation of microscopic dots especially below vein 1.

In *Snowi* and *Sackeni* the median space is filled with brown of solid color.

This new species, *Autographa diversigna* is described from nine specimens taken by Mr. K. Bowman at Nordegg, Alberta, and one specimen taken by Mr. Bean at Laggan. The type is with the author, also paratypes. Two paratypes are with Mr. Bowman, and one has

been sent to the museum at Ottawa, in appreciation of courtesies extended.

***Autographa interalia* new species.**

This is a new form, also discovered at Nordegg by Mr. K. Bowman, who has let me see two specimens, both females, and in fine condition, so that there can be no doubt about my determination of this as a new form. I mention this because of the fact that I myself collected a male of this species at Banf, but being a poor specimen I mistakenly placed it with my series of *alias*. *Interalia* adds one more species to the group including *alias* and *rectangula*, having the same peculiar sign. It varies from them by being uniformly gray and practically unsilvered. *Alias* is browner with more silver whereas *rectangula*, though brown, is of a blacker hue than *alias*.

The type of *interalia* is with the author, and a paratype with Mr. Bowman, both females.

***Autographa rectangula* race *nargenta* new race.**

*Autographa rectangula*, the older name, takes precedence over *Autographa mortuorum*, and in many lists is given as a synonym. Sir George Hampson, with good judgment I think, retains *mortuorum* as an aberration, thus accounting for the name. *Mortuorum* differs from *rectangula* only in the sign, which in *mortuorum* is divided so that it has an outer dot. In some specimens this dot even is absent, only the inner half of the sign appearing. This form, or "aberration" as Sir George Hampson calls it, occurs more often in Canada than in the United States.

I believe that I have discovered a race of this species worthy of a name. I have suspected this for some time, basing my notion upon two specimens sent to me by Mr. Hanham from Vancouver's Island, and my suspicion has been confirmed by considerable material received from Mr. Cockle, at Kaslo, B. C. I may say in passing that Mr. Cockle has taken numerous species that I have heretofore obtained mainly from Vancouver.

In the typical *rectangula* the T.P. line usually shows merely as the inner edge or border of a silvery cloud which more or less fills the space between the T.P. line and the outer border of the primaries. I have examined two hundred eastern examples.

In the new race, *nargenta*, there is much less silvering, and the ground color is blacker, making the insect, as a whole, darker. The best distinguishing character will be the T.P. line which is distinct and doubled, inclosing silver.

The type and paratypes are with the author, but paratypes have been sent to Mr. Cockle and Mr. Bowman.

***Autographa celsa* race *sierræ* new race.**

I recently sent to Sir George Hampson a set of four specimens of *Autographa celsa* showing the range of variation, which is from a light brown to almost black. In reply he writes as follows: "I should call all these specimens *octoscripta*, Grote. H. Edwards distinctly describes the stigma of the Oregon species as greenish and silvery, whilst in those you send it varies from pure white to golden silvery."

There are at hand two "types" of *celsa*, one in the Edwards collection in the American Museum of Natural History, and the other in the Neumoegen collection, Brooklyn Museum. We may perhaps call the sign in the former silvery, but in the latter it is certainly golden.

I have a long series taken by Mr. Hanham in Vancouver's Island. I have specimens from Oregon and specimens also taken by Mr. Cockle in Kaslo, B. C. These have been identified by comparison with the above mentioned types, and though this species varies, quite as much as does *A. californica*, there is no doubt about this identification. Though I have never been able to find Grote's type of *octoscripta*, *celsa* is quite distinct from what I have been calling *octoscripta*. The sign in *celsa* therefore is variable from white, to silvery and golden.

Some three years ago at Lake Tahoe I captured five females of a beautifully soft gray creature which at first I thought to be a new species. Except in color however I cannot separate it from *celsa*. In the American Museum, I found a specimen of this form placed with *celsa*, and labeled "Sierra Nev., Cal." Later I found two specimens in the collection of Dr. Barnes labeled "Deer Park Springs, Lake Tahoe." More recently still Dr. Van Duzee sent me a specimen labeled "Trinity Meadows, Trinity County, Cal." Dr. Van Duzee writes me as follows: "Trinity Meadows, though much nearer the coast has many Sierra species and it is not surprising that a Tahoe

species should be taken there." Later still I have obtained a beautiful example taken by Miss Hewlett at Nellie, California. I believe therefore that we here have a California form of the Oregon and Canadian species. It may even prove to be a good species.

*Celsa*, race *Sierræ* is uniformly a soft bluish gray, rendering it quite distinct from the brownish or blackish-brown northern forms. The sign in all the specimens I have seen is bright golden.

Type with the author, paratypes with Dr. Van Duzee, Dr. Barnes and American Museum, N. Y.

**Autographa magnifica** new species.

This beautiful species was taken (if I am correctly informed) by one of the forestry entomologists of the Department of Agriculture, of the Dominion of Canada. It was taken at Ueluelet, Vancouver's Island, which I believe is at the northernmost and wildest part of the island. It is therefore the property of the museum at Ottawa, and I have been permitted the privilege of naming the species. More complete description will be published later, as with others herewith figured. At present it must suffice to say that while allied with *octoscripta* it is easily separated therefrom by the fact that the ground color is a clear creamy white, causing the lines and marks to show with great distinctness. Expanding 40 mm., it is larger than any example of *octoscripta* that I have seen. The type, a female, remains with the Ottawa museum.

I may mention here that I have a male specimen taken in Vancouver's island which is most puzzling, being intermediate between this new form, *magnifica*, and *octoscripta*. It is generally speaking much darker than *magnifica*, possibly due to the fact that the lighter color is profusely dotted with macroscopic black dots, a characterization however also seen in *octoscripta*. Nevertheless this may prove to be the male form of *magnifica*, to which opinion I am more inclined by the fact that I have never seen *octoscripta* from the west coast.

**Abrostola microvalis** new species.

This is a species of which I have had a single specimen for nearly twenty years. More recently I have obtained others, and I propose the above name, because in general appearance it is a minute *ovalis*. A more accurate description will be given later. It expands 24 mm., the female 26 mm. Habitat Texas.





1



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2



3



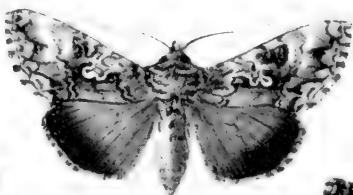
12



4



5



13



6



7



14



8



9



10

Type with the author, and paratype with Dr. Barnes.

That *microvalis* may not be confused with *parvula*, which is of the same size, I figure both, my specimen of *parvula* being presented to me by Dr. Barnes and identified by comparison with his type.

**Autographa alta** new name.

*Autographa excelsa* Ottol.

I have already stated that I am not prepared at present to discuss Sir George Hampson's generic separation, but in one respect it interests me. In 1902 I described a new species, giving it the name *excelsa*. This name Sir Geo. Hampson retains placing it, however, under *Syngrapha*. Then under *Phytometra* appears *excelsa*, Kretschmar. If however we should adopt the generic arrangement of Barnes and McDonnough, both of these *excelsas* would be included under *Autographa* so that my name would fall, as a homonym. This would not be the case were Dr. Dyar's arrangement retained, because Dr. Dyar lists *metallica* under *Plusia*, and *excelsa* Krets., is congeneric with *metallica*. But Barnes and McDonnough have removed *metallica* from *Plusia*, listing it as an *Autographa* under which rule *excelsa* Krets. would also be included and as stated before we would have two *excelsas* under *Autographa*. In these circumstances I prefer to offer another name.

When I first described this species I looked upon it as an inhabitant of high altitudes; hence the name *excelsa*. On a visit to Lake Louise, I followed the trail up to Lake Agnes, and just before reaching that point I found a rather large patch of flowering plants on which this species was feeding, and in half an hour before sunset I captured twenty-five specimens. It is for this reason that in abandoning the name *excelsa*, I propose the name *alta*.

#### EXPLANATION OF PLATE XV.

- Fig. 1. *Autographa sackeni* Grt.
- Fig. 2. *Autographa diversigna* n. sp. (from type).
- Fig. 3. *Autographa snowi* Hy. Edw. (from type).
- Fig. 4. *Autographa snowi* Hy. Edw.
- Fig. 5. *Autographa interalia* n. sp. (from type).
- Fig. 6. *Autographa alias* Ottol.
- Fig. 7. *Autographa rectangula* Kirby.
- Fig. 8. *Autographa rectangula*, race *nargenta* n. race (from type).
- Fig. 9. *Autographa celsa* Hy. Edw. (dark form).

Fig. 10. *Autographa celsa*, race *sierræ* n. race (from type).

Fig. 11. *Abrostola parvula* B. and McD.

Fig. 12. *Abrostola microvalis* n. sp. (from type).

Fig. 13. *Autographa magnifica* n. sp. (from type).

Fig. 14. *Autographa celsa* Hy. Edw. (from type).

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## IDIOCERUS COGNATUS FIEBER, ESTABLISHED IN NORTH AMERICA.

BY CHRIS E. OLSEN,

WEST NYAK, N. Y.

In 1908 the writer collected several specimens of an *Idiocerus* belonging to a species unknown to our fauna and submitted these to Mr. E. P. Van Duzee for determination. They came back labelled "*Idiocerus* sp. unknown to me." Mr. Van Duzee further remarked in an accompanying note that as soon as time permitted he would look up regarding these. Since then specimens have been collected from time to time in various places. On October 10, 1916, by sweeping the lower branches of a white poplar (*Populus alba*), over one hundred specimens were collected in half a dozen sweeps of the net. A great many more could have been taken from this tree, of which there are only two in the immediate neighborhood. Nearly all were females, only five males in the lot.

Coincidentally with this Messrs. Harry B. Weiss and Edgar L. Dickerson presented specimens of this same *Idiocerus* species which they had also taken abundantly on *Populus alba* in New Jersey, and, contemplating the working out of its life history, its identity was obviously desired. It was at first thought to be a new species, but in looking up some European literature several descriptions were met with which applied very well. For the present and until specimens can be obtained from Europe to compare with our American form, it will be safe to call it *Idiocerus cognatus* Fieber = *I. distinguendus* Kirschbaum.

As far as can be ascertained from descriptions and figures it resembles somewhat *I. rufus* Gillette and Baker and *I. rufus* var. *cingulatus* Ball, but in the structural characters of the face and geni-



talia and in the color it differs from *I. rufus*. The variety *cingulatus* comes closer in color, but its structure is too indefinitely described to permit of comparison. The following description will further serve to identify it.

Face one-fifth wider than long; clypeus nearly one-half longer than broad at apex, about twice as long as at its base, distinctly swelling lateral at the truncated apex; lorae longer than clypeus and its width four-fifths that of the clypean apex; genæ depressed beneath the eyes, the lateral margins slightly convex just below the eyes, then more or less straight attaining the tip of the clypeus; front as broad as long; antennæ without any disk. Vertex a trifle shorter on the middle than next to the eyes; the distance between the eyes more than four times the length of the center of the vertex; fine transverse rugosity barely visible. Pronotum more than twice as long as broad. Scutellum one and one-half times as broad as long, with a decided impression on the disk. Face, vertex, pronotum and scutellum very finely and evenly granulated. Elytral veins prominent and with punctures, four apical and three anteapical cells; inner anteapical cell more than twice as long as the outer one. Last ventral segment of the male twice triangularly excavated, leaving a prominent, triangular, central tooth with a slightly rounded tip, the whole segment longitudinally rugulose. Plates long and twisting near the apex, terminating in long, fine, white hairs. Last ventral segment of the female strongly rounding and without any median notch, ovipositor slightly longer than pygofer.

Color of male. Face from greenish white to strong yellow in the highly colored specimens; ocelli yellowish brown, encircled with pale; eyes dark red, sometimes nearly black; basal segments of the antennæ the color of the face, the long, tapering filamentts rapidly becoming quite dark. Vertex like the face, with a tendency to be slightly darker discoidally and devoid of any spots. Disk of pronotum with a bluish-gray cast; margins paler, usually with a pair of faint dark spots on the anterior half. Scutellum yellow with the discal impression dark, in some specimens quite strongly marked; basal angles sometimes marked with brown triangles. Elytra transparent milky white, with the area from the base to about the level of the tip of the scutellum a trifle smoky; a stronger smoky brown area located from just behind the middle to before the tip of the clavus, extending

transversally between points just in front of the outer anteapical cells; a third smoky area covering the three inner apical cells and the appendage. Veins in the light areas milky white and in the dark areas dark brown. Body and legs below pale, except the distal tips of the tibiae and the tarsi, which are tipped with brown, and the blackish claws.

The females are generally more strongly colored, usually with a large dark spot on the rounded vertex, bisected by a pale line, and a black spot on either side, the elytra and scutellum are also stronger marked in this sex.

This species occurs in Central Europe. Fieber described it from a male from Austria. (Have been unable to consult Kirschbaum's writings.) Edwards gives only a few localities of its occurrence on the British Islands. Jensen Haarup gives a single locality in Denmark. In this country it has been taken at the following places: Maspeth, L. I., N. Y., Aug. 1, 1908, Oct. 10, 1916, Sept. 1, 1917; Port Washington, L. I., N. Y., Sept. 15, 1908; Winfield, L. I., N. Y., July 17, 1909 (Chris. E. Olsen). Irvington, N. J., July 14, and other New Jersey localities (Edgar L. Dickerson and H. B. Weiss). In all cases where food-plant is mentioned *Populus alba* is given.

I wish here to express my appreciations to Prof. Herbert Osborn, Dr. E. D. Ball and Mr. E. P. Van Duzee for their kind and helpful correspondence of which I availed myself in the preparation of the above notes.

#### EXPLANATION OF PLATE XVI.

Fig. 1. Face of a female.

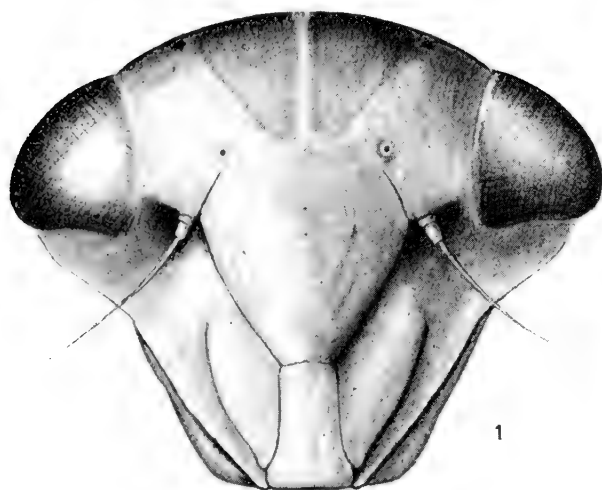
Fig. 2. Dorsal view of a male.

Fig. 3. Genitalia of a female.

Fig. 4. Genitalia of a male.

Figs. 1, 3, and 4 are drawn to the same scale, fig. 2 is only half the size of the others.

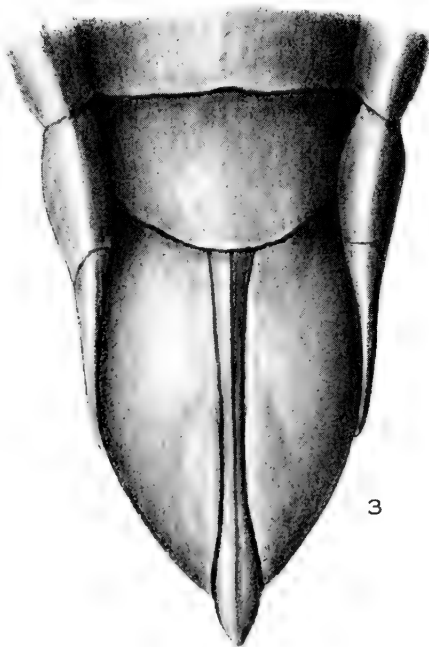




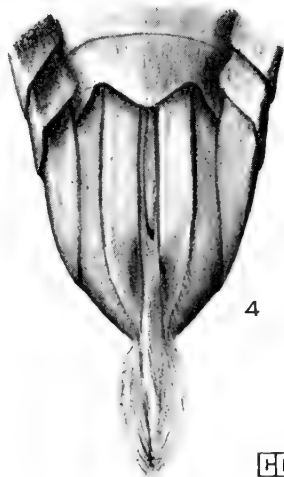
1



2



3



4

ED

*Idiocerus cognatus* Fieber.



## NOTES ON THE EARLY STAGES AND LIFE HISTORY OF IDIOCERUS COGNATUS FIEB., IN NEW JERSEY.

By EDGAR L. DICKERSON AND HARRY B. WEISS,<sup>1</sup>

NEW BRUNSWICK, N. J.

This species was first observed by us during the summer of 1917 on white poplar (*Populus alba*) growing in a nursery at Irvington, N. J., and the following observations were made during the spring and summer of 1918. . .

The eggs of this species are deposited singly during the middle and last of July in the new growth, terminal twigs usually being selected. Any of the new wood is likely to contain eggs, but they are found most plentiful in the last foot of the twig and more sparingly toward the base and the extreme tip. The place of oviposition is indicated by a somewhat irregular, pear shaped blister or swelling about 1 mm. long and 0.5 mm. wide. In many cases, the cap of the egg projects slightly from the surface of the twig. If the egg has been inserted far enough to hide the cap, the bark around the cap becomes somewhat corky and splits. Each egg is firmly embedded in the bark tissue and not simply inserted in the bark as is the case with the egg of *Idiocerus scurra*. As a rule each egg is placed in a slanting position with its long axis more or less at an angle with the grain of the tissue. Sometimes eggs were found in irregular groups of two or three, but more often singly.

Hatching takes place from the middle to the last of May and the young nymphs can be found on the unfolding tender leaves at the tips of the twigs. The upper leaf surface seems to be preferred, many of them resting close to the midrib at the base of the leaf. Some however can be found on the lower leaf surface. As the nymphs become older, they scatter, many resting on the stems of the new growth usually close to a leaf petiole. On the whole, the upper surfaces of new leaves are preferred. Here they blend with the whitish bloom of the young leaves and only those with distinct blackish markings are readily seen. Moulting takes place on the

<sup>1</sup> The arrangement of the authors' names has no significance.

lower leaf surface as cast skins of various stages are found here and on no other part of the tree.

Each nymphal stage requires from three to six days. The first nymphs appeared May 13 and the first adults on June 12. Practically one month was required for the nymphal stages although cool weather which prevailed from the middle of May throughout June may have prolonged the lengths of the stages. The bulk of the adults appeared during the last of June and the first part of July. By July 12 no fifth stage nymphs could be found and overwintering eggs were being deposited. There is but one generation each year and adults are found in diminishing numbers throughout August and as late as October.

The older nymphs and adults scattered considerably and could be found on the leaves at the tips of the branches all over the infested trees, even at the extreme top. As a rule the majority of adults were found on the twigs. The adults were very active and usually moved readily when disturbed. In common with many other species they moved around the twig to the side away from observer. Even when present in large numbers no appreciable damage to the foliage was observed. Where many nymphs fed on the young leaves, the foliage showed some slight malformation and whitening due to the abstraction of the sap, but the injury was not serious.

As the white poplar is a native of both Europe and Asia and according to Keeler imported into this country very early, it seems evident that *Idiocerus cognatus* was introduced in the egg stage with this tree. In New Jersey, we have found it at Irvington, Asbury (Warren Co.), Princeton Junction, Rutherford and Paterson and it undoubtedly exists on white poplar at many other places. The New Jersey records and those of Mr. Oslen for Long Island, N. Y., indicate that it is well established in the East. A description of the adult and the synonymy is given in Mr. Olsen's paper in this issue and need not be repeated here. For illustrations of the adult and of the male and female genitalia see Mr. Olsen's paper.

*Egg*.—Length 1.11 mm. Greatest width 0.35 mm. Translucent, elongate, broadest at middle, slightly curved when viewed laterally, broadly rounded at basal end, slightly tapering toward cap. Cap oval, brown, with center light.

*First Nymphal Stage*.—Length 1.34 mm. Width of head includ-

ing eyes 0.51 mm. Color white. Broadest across the head. Sides of thorax subparallel, slightly widest in front. Basal segments of abdomen slightly broader than posterior portion of thorax and gradually rounding to its posterior end. Antennæ from one-third to one-half the length of the body, apical third dark. Eyes prominent consisting of numerous ommatidia. Head broadly rounded in front, slightly sinuate just before eyes, front and vertex sparsely covered with fine hair. Thorax one and one-half times the length of the head, segments of equal length, each segment slightly broader at posterior than at anterior end. Abdomen varying in length, about one and one-third the length of the thorax. Dorsal surface of body bearing a number of fine hairs. Hairs on abdomen are arranged in longitudinal rows, four dorsal and two lateral. Legs white, bearing a number of fine hairs. Rostrum extending to metathorax.

*Second Nymphal Stage.*—Length 1.6 mm. Width of head including eyes 0.7 mm. Somewhat similar to preceding stage. Antennæ shorter, head shorter. Thorax twice as long as head. Thoracic segments subequal. Sides of meso- and metathorax slightly extended posteriorly. Abdomen twice as long as thorax. Hairs on body more pronounced. A few specimens show two longitudinal light brown dorsal bands extending from head to apex of abdomen and equal in width to light band between them.

*Third Nymphal Stage.*—Length 2.5 mm. Width of head including eyes 0.9 mm. Somewhat similar to preceding stage. Antennæ shorter, head somewhat shorter and more transverse. Posterior extension of meso- and metathoracic segments more pronounced. Most forms of this stage appear to show some markings varying from traces of light bands on thorax to well-defined dark bands extending from head to apex of abdomen with vertex and portion of front of head, portions of legs and some median spots on ventral surface of apical abdominal segments dark.

*Fourth Nymphal Stage.*—Length 3.5 mm. Width of head including eyes 1.2 mm. Head including eyes slightly broader than thorax. Sides of thorax parallel. Abdomen gradually tapering toward tip. Antennæ short, about one-half width of head. Head convex, four times as broad as long, anterior and posterior margins parallel, front and vertex finely pubescent. Prothorax at middle one and one-half times length of head. Mesothorax slightly longer and

metathorax one-half as long as prothorax at middle. Wing pads of meso- and metathorax extending beyond anterior margin of third abdominal segment. Rostrum extending to between second pair of legs. Sexes distinguishable in this stage. Hairs of legs more pronounced. Markings of dark forms similar to those of preceding stage.

*Fifth Nymphal Stage.*—Length 4.6 mm. Width of head including eyes 1.5 mm. Shape somewhat similar to that of fourth stage, more elongate. Dark markings less pronounced, except dark band on vertex of head. Antennæ one-half width of head. Head similar to that of preceding stage, more or less slightly sinuate in front. Front and vertex finely pubescent. Pronotum at middle one and one-half times the length of the head, transversely grooved on posterior dorsal surface. Mesonotum extending posteriorly at middle where it is broadly rounded, somewhat longer than pronotum. Metanotum one-half length of pronotum. Wing pads of meso- and metathorax extending to third abdominal segment. Rostrum similar to that of fourth stage. Hairs on body more pronounced than in preceding stage.

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## RECORDS AND DESCRIPTIONS OF NEOTROPICAL CRANE-FLIES (TIPULIDÆ, DIPTERA). I.

BY CHARLES P. ALEXANDER,

URBANA, ILL.

During the past few years a number of collections of crane-flies from various localities in South and Central America have been available for study. Some of the more interesting new species are discussed in the present article. In addition, the records of a few species whose known range is greatly extended are also given, most of them being South American forms that are now admitted to the North American Fauna for the first time.

The collections studied in this paper are as follows:

ARGENTINA, a small lot from Catamarca, through the kindness of Señor Pedro Jorgensen-Hansen.

COLOMBIA, a small collection from the Santa Marta region, taken



by Messrs. E. B. and J. H. Williamson (see A Collecting Trip to Colombia, South America, by E. B. Williamson: Misc. Publ. 3, Mus. Zööl., Univ. of Mich.; 1918).

COSTA RICA and PANAMA, several fine lots of specimens taken by Dr. Axel Olsson.

In addition to the above, considerable material was studied in the collections of the American Museum of Natural History, mostly from the Greater Antilles and British Guiana; the United States National Museum from Chile (Porter), Panama (Busck and Zetek), etc., and in the collection of Mr. Charles W. Johnson from the Lesser Antilles (Ballou). I am greatly indebted to all the gentlemen mentioned for the privilege of examining this material. Unless stated to the contrary, the types are in the collection of the writer.

Genus *Dicranomyia* Stephens.

*Dicranomyia porteri* new species.

Antennæ dark throughout; mesonotal præscutum with the stripes confluent, shiny brown; pleura grayish; abdomen dark brown, yellowish at the end; wings pale grayish with indistinct darker seams along the cord; vein *Sc* short, *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub>, cell 1st *M*<sub>2</sub> closed.

*Female*.—Length, 6–6.5 mm.; wing, 6–6.6 mm.

Rostrum and palpi blackish. Antennæ short, dark brown throughout, the flagellar segments short-oval. Head dark brown, gray pruinose, the vertex between the eyes very narrow.

Mesonotum rather shiny brown, the usual three præscutal stripes confluent; humeral region and the lateral margins of the præscutum pruinose; scutellum and postnotum sparsely gray pruinose. Pleura pale brown, gray pruinose. Halteres short, pale at the base and on the knobs, the stem brown. Legs with the coxæ and trochanters brownish-yellow; remainder of the legs light brown. Wings broad with a slight grayish tinge; stigma large, pale gray; indistinct and very pale gray clouds on the disk, darkest at the tip of *Sc*<sub>1</sub> and the origin of *Rs*, paler and broader along the cord and the outer end of cell 1st *M*<sub>2</sub>. Venation: *Sc* short, ending opposite the origin of the sector; *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub>; *r* at the tip of *R*<sub>1</sub>; *Rs* strongly arcuated to almost square at its origin, about one-half longer than the deflection of *R*<sub>1+2</sub>; cell 1st *M*<sub>2</sub> large, closed, pentagonal to rectangular; basal reflection of *Cu*<sub>1</sub> inserted just before the fork of *M*.

Abdomen blackish-brown, the seventh to ninth segments and the valves of the ovipositor conspicuously yellow.

Habitat: Chile.

Holotype, ♀, Antofagasta, May, 1912 (Carlos E. Porter).

Paratopotypes, 3 ♀♀.

Type in the collection of the U. S. National Museum.

**Dicranomyia jorgenseni** new species.

Antennæ black; head gray; thoracic præscutum with five chestnut-brown stripes, the three intermediate narrow; pleura gray with a narrow brown stripe; femora yellowish with a narrow dark brown subterminal ring; wings subhyaline with dark brown spots, apex of the wings darkened; *Sc* short, *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub>.

*Male*.—Length, about 5.5 mm.; wing, 7.4 mm.

*Female*.—Length, 6.5–6.9 mm.; wing, 7–7.6 mm.

Rostrum and palpi dark brown. Antennæ dark brownish-black. Head light gray.

Mesonotal præscutum with a pale brownish-gray bloom; lateral margins of the sclerite dark brown; thoracic stripes narrow, chestnut-brown, the middle stripe ending far before the suture; the sublateral stripes cross the suture and appear as a narrow stripe on the proximal third of the scutal lobes; remainder of the scutum and the scutellum light grayish; postnotum dark brown with a sparse gray bloom. Pleura grayish with two brown longitudinal stripes, the sternal stripe broader, the dorsal stripe beginning just above the fore coxa. Halteres yellow, the knobs dark brown. Legs with the coxæ and trochanters light yellow; femora yellow with a dark brown subterminal ring, this being two or three times as wide as the pale tip; tibiæ yellowish-brown, darker at the tips; tarsi light brown, the terminal segments darkened. Wings grayish subhyaline with a heavy brown pattern, arranged as follows: at the arculus; in cell *R* midway between the arculus and the origin of the sector; stigmal blotch enclosing a rounded hyaline spot before crossvein *r*; tip of the wing in cells *2d R*<sub>1</sub>, *R*<sub>3</sub>, *R*<sub>5</sub> and *2d M*<sub>2</sub>; narrow seams along the cord and outer end of cell *1st M*<sub>2</sub>; a rounded spot at the tip of the second anal vein. Venation (Plate I, Fig. 3): *Sc* short, ending just beyond the origin of *Rs*; *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub>; *Rs* almost square at its origin; basal deflection of *Cu*<sub>1</sub> some distance before the fork of *M*.

Abdomen dark brown, the sternites paler medially.

Habitat: Argentina.

Holotype, ♂, Esquina Grande, Catamarca, May 1, 1915 (P. Jorgensen).

Allotopotype, ♀.

Paratype, ♀, Cerro de Carocal, Catamarca, altitude 3100 meters, February 17, 1915 (P. Jorgensen).

The types bear the label "common on the rivers."

**Dicranomyia parishii** Alex.

1914. *Dicranomyia parishii* Alex.; Trans. Am. Ent. Soc., Vol. 40, pp. 226, 227.

Two specimens from Gatun, Canal Zone, Panama, December 12–14, 1912 (Zetek). The species has been recorded only from British Guiana.

**Dicranomyia apicata** Alex.

1914. *Dicranomyia apicata* Alex.; Trans. Am. Ent. Soc., Vol. 40, pp. 225, 226, Plate 3, Fig. 1.

Two specimens from Gatun, Canal Zone, Panama, December 12-14, 1912 (Zetek). The species has been recorded only from British Guiana.

**Dicranomyia fumosa** (Alex.).

1912. ?*Furcomyia fumosa* Alex.; Can. Ent., Vol. 44, p. 364, Plate 11, Fig. t.

One female from the Rio Chico, near the mouth of the Rio Porcona, Department of Panama, Panama, August 4, 1918 (Olsson). Like the two preceding species this interesting fly had been known hitherto only from British Guiana.

**Genus Peripheroptera** Schiner.**Peripheroptera subandina** new species.

Antennæ black; mesonotum yellow, the præscutum with three dark brown stripes; legs dark brownish-black; wings pale grayish, the center of the disk almost hyaline, a broad brown seam along the cord.

*Male*.—Length, about 6.5 mm.; wing, 9.4 mm.

Fore leg, femur, 5.8 mm.; tibia, 6.4 mm.; middle leg, femur, 6.5 mm.; tibia, 6.7 mm.

Rostrum and palpi dark brown. Antennæ black, the flagellar segments oval. Head dark brown; a golden line along the inner margin of the eye and passing across the front; a pale area on either side of the middle line of the vertex.

Pronotum dark brown, laterally yellowish-gray pruinose. Mesonotal præscutum yellow pollinose with three dark brown stripes, the median stripe very broad, becoming obsolete and bifid before the suture, the lateral stripes short and narrow; scutum with the median area broadly golden-yellow and with a sharp median carina, remainder of the lobes dark brown; scutellum reddish with a golden yellow pollen; postnotum dark brown with a yellowish V-shaped area. Pleura brownish-yellow, more grayish underneath the wing-root, more brownish on the mesosternum. Halteres dull yellow, knobs dark brown. Legs with the coxæ and trochanters dull brownish-yellow; femora dark brownish-black, paler on the basal third; tibiæ and tarsi black. Wings with a pale grayish suffusion; the center of the disk, including the bases of cells  $R_3$ ,  $R_5$ , 1st  $M_2$  and the ends of cells  $R$  and  $M$  more nearly hyaline; costal region more brownish-yellow; stigma dark brown; a broad brown seam along the cord and a less distinct seam along the outer end of cell 1st  $M_2$ . Venation (Plate I, Fig. 2): inner ends of cells  $R_3$ ,  $R_5$  and 1st  $M_2$  about on a line.

Abdomen dark brown, the segments very narrowly and indistinctly ringed with paler.

Habitat: Argentina.

Holotype, ♂, El Suncho, Catamarca, altitude 2500 meters, April 28, 1915 (P. Jorgensen).

In my key to the species of *Peripheroptera* (Ent. News, vol. 24, p. 409, 1913) this species runs to *P. schincri* O. S. of Brazil which differs in having a shiny yellowish-red thorax with an anterior black stripe, the legs yellow with the tips of the femora darker and the wings faintly yellowish.

Genus **Geranomyia** Curtis.

**Geranomyia nigripleura** new species.

Size small; rostrum moderately elongate, exceeding the combined head and thorax; mesonotum reddish-brown, the præscutum with indistinct stripes; thoracic pleura yellow with a broad dark brownish-black stripe that covers the dorsal sclerites; legs uniformly pale brown, the tarsi more yellowish; wings strongly infumed, the cord narrowly seamed with dark brown; abdominal tergites dark brown, the sternites bicolorous, brown and dull yellow.

*Male*.—Length, excluding the rostrum, 5.1 mm.; wing, 5.3 mm.; rostrum, 2.3–2.4 mm.

*Female*.—Length, excluding the rostrum, 4.8 mm.; wing, 5.1 mm.; rostrum, 2.6 mm.

Rostrum dark brown, a little paler distally, moderately elongated, longer than the head and thorax taken together. Antennæ black. Head dark gray.

Mesonotal præscutum rich reddish-brown with three narrow and indistinct darker stripes; lateral margins of the sclerite broadly yellowish; scutum yellow with the lobes reddish-brown. Pleura yellow, the dorsal pleurites dark brownish-black producing a broad stripe that extends from the cervical sclerites to the base of the abdomen and includes the halteres. Halteres dark. Legs with the coxæ and trochanters pale yellow; femora uniformly brown excepting the bases which are paler; tibiæ brown; tarsi pale yellowish-brown. Wings with a strong brownish tinge, deepest at the apex; stigma rounded oval, dark brown; indistinct dark brown seams at the tip of *Sc* and the base of the sector; less distinct seams along the cord and outer end of cell *1st M*<sub>2</sub>. Venation (Plate I, fig. 1): *Sc* short, extending from just beyond the origin of the sector to opposite one-third its length; *Sc*<sub>2</sub> at the tip of *Sc*<sub>1</sub>; *Rs* about as long as cell *1st M*<sub>2</sub>; basal deflection of *Cu*<sub>1</sub> at or just beyond the fork of *M*.

Abdominal tergites dark brown; sternites dull yellow on the apical half, brown on the basal half; ventral pleural appendages of the male hypopygium large, fleshy, brown. Valves of the ovipositor short, acute, the tergal valves slightly exceeding the sternal valves.

Habitat: Panama.

Holotype, ♂, San San, Department of Bocas del Toro, June 21, 1917 (Axel Olsson).

Allotopotype, ♀.

Paratopotypes, 1 ♂, 1 ♀.

This very interesting species may be confused only with *G. lineata* End. and *G. scolopax* Alex. From *lineata* it differs in its small size, coloration of the thoracic dorsum and pleura, and in the wing-pattern, there being no costal spot basad of the origin of the sector. From *scolopax* it is readily told by the long rostrum and dark colored wings without a dark spot at midlength of subcosta.

#### Genus *Rhamphidia* Meigen.

##### *Rhamphidia albitarsis fuscipes* new subspecies.

*Male*.—Length, 5–5.7 mm.; wing, 5–5.8 mm.

Average size smaller than typical *albitarsis* O. S.; thoracic dorsum dark brown, the humeral region a little paler. Pleura pale brown. Tarsi pale brown, only a shade lighter than the remainder of the legs. Wings pale brown, the stigma and costal region a little darker (Plate I, Fig. 4).

Habitat: Panama, Costa Rica.

Holotype, ♂, San San, Department of Bocas del Toro, Panama, June 21, 1917 (Axel Olsson).

Allotype, ♀, Zent River, Costa Rica, May 13, 1917 (Axel Olsson).

Paratopotypes, 8 ♂ ♀; paratype, ♀, with the allotype.

The specimen of *Rhamphidia albitarsis* from British Guiana mentioned by the writer in an earlier paper (Trans. Am. Ent. Soc., vol. 40, p. 230, 1914) probably belongs here.

##### *Rhamphidia albitarsis fumipennis* new subspecies.

*Male*.—Length, 6.5 mm.; wing, 6.5–7 mm.

Entire body and wings dark brownish black. Rostrum elongated. Legs black with the tarsal tips pure white as in typical *albitarsis*. The venation is shown on Plate I, Fig. 5.

Habitat: Panama.

Holotype, ♂, Silico Creek, Department of Bocas del Toro, October 4, 1917 (Axel Olsson).

Paratopotype, ♂.

#### Genus *Gonomyia* Meigen.

##### *Gonomyia (Gonomyella) subcostata* new species.

Antennæ with the scape yellow, the flagellum dark brown; mesonotum brownish-yellow with intense black markings; pleura white with a broad black dorsal stripe; legs yellowish, the tips of the segments darker; wings pale brownish-gray; *Sc* very long; *r* on the long  $R_{2+3}$  before midlength;  $R_2$  short, oblique.

*Female*.—Length, 5.5 mm.; wing, 4.6 mm.

Rostrum and palpi dark brown. Antennæ with the first segment brownish-yellow, the second segment yellow with the apex darker; flagellar segments long-oval, dark brown the black verticils longer than the segments. Head brownish.

Mesonotal præscutum reddish-yellow, the extreme margin almost white; three black stripes, the median one shiny, broadest in front, becoming indistinct behind; lateral stripes rounded-oval; scutal lobes blackish, the median area paler; scutellum largely dark; postnotum black, the lateral portions white. Pleura whitish, a broad black dorsal stripe extending from the cervical sclerites to the abdomen; sternites dark brownish-black. Halteres pale brown, the knobs darker brown with the extreme tips yellowish. Legs with the coxæ the trochanters whitish; femora yellow with the extreme tips brown; tibiæ yellow, the tips blackened; metatarsi yellowish, brownish at the tips; remainder of the tarsi dark brown. Wings with a faint brownish-gray tinge, the costal region more yellowish; stigma small, pale brown; veins dark brown, those of the costal region more yellowish. Venation (Plate I, Fig. 10):  $Sc$  very long, terminating just before the fork of the sector;  $Sc_2$  far removed from the tip of  $Sc_1$ ;  $R_s$  long, almost straight beyond the origin;  $r$  before the middle of the long  $R_{2+3}$ ;  $R_2$  short, oblique, a little shorter than  $R_{2+3}$ ; cell  $1st\ M_2$  open by the atrophy of the outer deflection of  $M_3$ ; petiole of cell  $M_2$  a little shorter than the cell; basal deflection of  $Cu_1$  at the fork of  $M$ .

Abdominal tergites brown, the sternites paler; ovipositor reddish; tergal valves of the ovipositor long and but slightly upcurved, acute at the tips; the shorter sternal valves bear long fringes of hairs along the margin. The abdomen of the type is partly filled with large eggs which give a dark color to that part of the body.

Habitat: Panama (Darien).

Holotype, ♀, Rio Chico, near the mouth of the Rio Porcona, Department of Panama, August 4, 1918 (Axel Olsson).

This handsome little species is obviously related to the type of the subgenus, *G. (G.) slossonæ* Alex., but differs from it in the diagnostic characters outlined above.

#### **Gonomyia (Leiponeura) gladiator** new species.

Generally similar to *G. (L.) pleuralis* (Will.) and related species; outer angle of the hypopygial pleurite produced into a slender, chitinized hook that is longer than the pleurite alone.

*Male*.—Length, 5.5–6.4 mm.; wing, 4 mm.

*Female*.—Length, 6.7–6.8 mm.; wing, 4.5–4.7 mm.

Rostrum and palpi dark brown. Antennæ with the scape brownish-yellow, the flagellum dark brown, in the male with exceedingly elongate verticils. Head yellowish, darker medially.

Disk of the mesonotum rich brown, the margin light yellow. Pleura

yellow with two very broad dark brown stripes, the dorsal one much broader than the narrow ventral stripe, which, in turn, is still narrower than the pale vitta enclosed. Halteres short, dark. Legs with the coxæ pale, excepting the outer face of the fore coxa and the extreme base of the middle coxa which are dark colored; trochanters dull yellow; femora dull yellow, darker near the tips; tibiæ and tarsi dark brown. Wings with a strong grayish-brown suffusion, darkest on the anterior half, in cell  $R_3$  and along the cord; stigma oval, dark brown, situated in the pale cell  $R_1$ . Venation (Plate I, Fig. 11):  $Sc$  moderately long, ending before the origin of the sector, the distance between them a little greater than the basal deflection of  $R_{4+5}$ ; inner end of cell 1st  $M_2$  pointed; basal deflection of  $Cu_1$  just before the fork of  $M$ .

Abdominal tergites brown, paler sublaterally, the lateral and posterior margins dark; sternites dull yellowish-brown, darker posteriorly. Hypopygium with the pleural pieces short and stout, the outer angle (ventral apical appendage) produced into a slender slightly curved chitinized hook that is about one and one-half times the length of the pleurite itself and much longer than the pleural appendages, on the outer face near the base with a small setigerous tubercle. Dorsal apical appendage elongate-cylindrical, fleshy, with rather numerous long hairs; internal apical appendage semi-flattened, the inner margin with numerous stout spines that are more powerful at the tip of the organ. Gonapophyses short but powerful, the dorsal pair smooth with about four chitinized points, the largest pair of which are bent dorsad, the ventral pair more slender and directed caudad. Ventral gonapophyses terminating in two short chitinized teeth that are separated by a deep V-shaped notch, the face with numerous setigerous tubercles.

Habitat: Panama (Darien).

Holotype, ♂, Real de Santa Maria, Department of Panama, April 10, 1918 (Axel Olsson).

Allotopotype, ♀.

Paratopotypes, 10 ♂ ♀.

### **Gonomyia (Leiponeura) producta** new species.

Generally similar to *G. (L.) scimitar* Alex.; outer angle of the pleurite of the hypopygium produced into a slender cylindrical fleshy lobe.

*Male*.—Length, about 3 mm.; wing, 3.2 mm.

Rostrum and palpi dark brown. Antennæ dark colored. Head dark.

Mesonotum rich brown, the præscutum margined with yellowish; the centers of the scutal lobes dark brown, the median area bright yellow; scutellum orange, darker basally; postnotum yellow with the center darker. Pleura dark purplish-brown with a broad yellow longitudinal stripe. Halteres short, yellow. Legs with the coxæ dark purplish-brown; trochanters dull yellowish-brown, the remainder of the legs broken. Wings subhyaline; stigma indistinct; veins yellowish-brown. Venation about as in *G. puer* Alex. and related species;  $Sc$  rather short, ending before the origin of the sector; veins

$R_{4+5}$  and  $M_{1+2}$  very close together at the wing margin, the distance separating them less than half the length of  $m$ .

Abdomen dark brown above, the dorso-median line and the posterior margins of the segments a little darker; sternites somewhat paler. Hypopygium with the dorsal angle of the pleurites produced caudad as a slender cylindrical fleshy appendage that is blunt at the tip and sparsely provided with coarse hairs. Ventral pleural appendage a slender curved hook, as in *G. scimitar* Alex. and related species, but even longer, more slender and more curved, bent ventrad, caudad and slightly laterad, the tip acute. The apical inner angle of the pleurite is produced into a short, compressed blade. The penis-guard and gonapophyses extend just beyond the base of the dorsal pleural appendage, pale, with the apex bifid.

Habitat: Lesser Antilles.

Holotype, ♂, Antigua, sweeping at Blubber Valley, March, 1908 (H. A. Ballou).

Type in the collection of Mr. C. W. Johnson.

In *G. scimitar* we get an approach to the accentuated condition occurring in *G. producta*, but here the dorsal outer angle of the pleurite is but slightly produced, not more than one-third the length of the pleurite.

**Gonomyia (Leiponeura) extensa** Alex.

1914. *Gonomyia (Leiponeura) extensa* Alex.; Trans. Am. Ent. Soc., Vol. 40, p. 243.

One male, two females, Gatun, Canal Zone, Panama, Dec. 12-14, 1912 (J. Zetek). These agree closely with the type, but the chitinated pleural appendages of the hypopygium lack the acute spines at the tips which may possibly be broken off. The species has been recorded only from British Guiana.

Genus **Trentepohlia** Bigot.

Subgenus **Neomongoma**, new subgenus.

Two branches of Media reach the wing-margin,  $M_3$  and  $Cu_1$  being entirely distinct;  $Cu_2$  and 1st  $A$  widely separated at the wing-margin.

Type of the subgenus.—*Mongoma disjuncta* Alex. (Brazil).

The large genus *Trentepohlia* (*Mongoma*) has been variously subdivided by recent workers on the Tipulidæ. It seems convenient, at least, to recognize some of these groups as subgenera. The four that seem best defined are as follows:

1. *Trentepohlia* Bigot (type *trentepohlîi* (Wied.)); syn. *Mongomioides* Brunetti (type *trentepohlîi* (Wied.)).



2. *Mongoma* Westwood (type *fragillima* (Westw.)).
3. *Paramongoma* Brunetti (type *albitarsis* (Dol.)); syn. *Mongomella* Enderlein (type *pallida* (Will.)).
4. *Neomongoma*, new (type *disjuncta* (Alex.)).

These groups may be separated by the following key:

1. Vein and cell  $M_3$  present (i. e., 4 posterior cells) ..... 2  
     Vein and cell  $M_3$  lacking (i. e., 3 posterior cells) ..... 3
2. Cell  $Cu$  widely open at the wing-margin (New World)..*Neomongoma* new.  
     Cell  $Cu$  closed by the fusion of  $Cu_2$  and 1st  $A$  at the wing-margin (Old World) .....*Mongoma* Westwood.
3. Cell 1st  $M_2$  open by the atrophy of  $m$ ; cell  $Cu$  closed by the fusion of  $Cu_2$  and 1st  $A$  at the wing margin (Old World)...*Trentepohlia* Bigot.  
     Cell 1st  $M_2$  closed; cell  $Cu$  open at the wing-margin (mostly New World; one species in Java) .....*Paramongoma* Brunetti.

***Trentepohlia* (*Paramongoma*) *albitarsis* (Dol.) of Java.**

This is a very rare species that has apparently not been found since its original discovery. To judge from Brunetti's recharacterization of the insect it agrees well with the Neotropical species of the subgenus except that the sector continues to the inner angle of cell 1st  $M_2$  obliterating the deflection of vein  $R_{4+5}$ .

The most generalized member of the genus so far made known is *T. disjuncta* (Alex.); the most specialized are species of the subgenus *Trentepohlia* of the *gracilis* group (*gracilis* (End.), *zambesica* (Alex.), *nigroapicalis* (Brun.), etc.).

***Trentepohlia* (*Paramongoma*) *sororcula* new species.**

General coloration light brown, tibiae broadly white at the tips; all the tarsi white; wings with the stigma pale.

*Male*.—Length, 7 mm.; wing, 6.2 mm.; hind leg, femur, 11.3 mm.; tibia, 11.7 mm.

*Female*.—Length, 8.6 mm.; wing, 6.3 mm.; fore leg, femur, 10.2 mm.; tibia, 11.4 mm.

Rostrum and palpi brown. Antennae dark brown, the flagellar segments almost cylindrical and rather elongate. Head brown.

Thorax shiny light brown, the pleura slightly more yellowish. Halteres short, brown. Legs with the coxae and trochanters yellowish; femora light brownish-yellow, the tips narrowly (.6–.9 mm.) white; tibiae with a white basal band that is subequal to or a little narrower than the apical ring of the femur; remainder of the tibiae brown except the broad (3.3–4 mm.) white tips; tarsi white. Wings with a slight yellowish tinge; stigma small, rounded, pale brown; veins dark brown. Venation (Plate I, Fig. 15): basal deflection of  $Cu_1$  just before the fork of  $M$ .

Abdominal tergites pale brown, the sternites still paler; female ovipositor with the elongate acicular valves of this group of species.

Habitat: Panama (Darien).

Holotype, ♂, Between the Rio Capeti and the Rio Yape, Department of Panama, June 27, 1918 (Axel Olsson).

Allotopotype, ♀.

In its uniformly white tarsi this species is allied to *T. leucoxena* (Alex.) of Mexico, a large species that is much darker colored, the stigma dark brown, the legs dark brown with the white femoral and tibial tips much wider, etc. It is probable that all of the known members of the *bromeliadicola* group of the genus breed in the water and detritus that accumulates in the leaf axils of bromeliaceous plants. The species of this group of the subgenus may be separated as follows:

1. All the tarsi white ..... 2  
Not as above; at least the fore and middle tarsi dark or else the metatarsi ringed basally with black ..... 3
2. Larger; abdominal tergites laterally yellowish; stigma dark brown (Mexico) ..... *leucoxena* (Alex.).  
Small and uniformly pale brown in color; stigma pale (Panama),  
*sororcula* n. sp.
3. All the tarsi dark brown ..... 4  
Not as above; at least the hind tarsi with white ..... 5
4. Tibiæ with the extreme tips white (Costa Rica)....*bromeliadicola* (Alex.).  
Tibiæ dark brown beyond the base (British Guiana)...*geniculata* (Alex.).
5. Hind tarsi white; middle tarsi brown (British Guiana)....*pallipes* (Alex.).  
All the tarsi white, the metatarsi with the basal quarter black (Panama),  
*metatarsata* (Alex.).

Genus **Gnophomyia** Osten Sacken.

**Gnophomyia laticincta** new species.

Coloration reddish-brown; femora pale brown, broadly tipped with darker; wings subhyaline with a broad indistinct band along the cord.

*Male*.—Length, 7.8 mm.; wing, 7.5 mm.

Rostrum and palpi short, dark brown. Antennæ moderately elongated, reddish-brown, the flagellar segments elongate-cylindrical, covered with a pale pubescence. Head reddish-brown; eyes large.

Mesonotum reddish-brown, the præscutum with the four stripes confluent and rather indistinct; humeral regions and the lateral margins more yellowish. Pleura pale with indistinct dark markings, sparsely gray pruinose. Halteres pale, reddish-brown basally, the knobs dark brown. Legs with the coxæ pale, sparsely gray pruinose; trochanters pale brown; femora pale brown, the tips broadly darkened and weakly incrassated; tibiæ brown, the tips narrowly

darkened; tarsi brown, darker apically. Wings broad, very pale brown; a broad pale brown band across the disk at the cord, the inner margin of this pale fascia just proximad of the cord, the outer margin just outside the end of cell 1st  $M_2$ , the center of which is paler than the ends; stigma elongate, dark brown; costal and subcostal veins yellowish, other veins dark brown. Venation (Plate I, Fig. 14):  $Sc$  long ending just before  $r$ ;  $Rs$  long, straight;  $R_{2+3}$  rather short, a little longer than the basal deflection of  $Cu_1$ ; deflection of  $R_{4+5}$  lacking,  $Rs$  in alignment with  $R_{4+5}$ ; cell 1st  $M_2$  rather long and narrow, the proximal end narrowed; basal deflection of  $Cu_1$  just before midlength of cell 1st  $M_2$ .

Abdomen reddish-brown, the sternites brighter; hypopygium pale. Hypopygium with the pleurites stout; dorsal pleural appendage short, the proximal angle produced into a dark cylindrical arm that is sparsely clothed with long coarse hairs at the tip and along the outer face; ventral pleural appendage longer, strongly curved, the apex rather blunt and unarmed.

Habitat: Panama.

Holotype, ♂, Porto Bello, April 19, 1912 (August Busck).

Type in the collection of the U. S. National Museum.

**Gnophomyia lachrymosa** new species.

General coloration dark brown; mesonotum with sparse yellowish markings; halteres black throughout; wings uniformly darkened.

*Male*.—Length, 6.5 mm.; wing, 6.4 mm.

Rostrum and palpi dark brown. Antennæ with the basal segments dark brown, the flagellum broken. Head dark brown, the vertex greatly narrowed.

Thorax discolored in the type; præscutum dark brown with the lateral margin and the humeral region paler; scutum with the posterior margin and postnotum with the lateral margin pale. Pleura pale with a broad and rather ill-defined dark brown dorsal stripe. Halteres short, blackish throughout. Legs with the coxæ and trochanters pale brown, remainder of the legs broken. Wings narrow with a uniform slight dusky tinge; stigma indistinct; veins dark brown. Venation (Plate I, Fig. 13):  $Sc$  long, ending opposite the oblique  $r$ ;  $Rs$  oblique, almost straight, in a line with  $R_{4+5}$ ;  $R_{2+3}$  a little shorter than  $Rs$ ;  $r$  at the fork of  $R_{2+3}$ ;  $R_2$  and  $R_3$  long, parallel; deflection of  $R_{4+5}$  lacking; basal deflection of  $Cu_1$  at about one-fourth to one-fifth the length of the long cell 1st  $M_2$ .

Abdomen dark brownish-black, the hypopygium a little more reddish. Hypopygium with the pleurites rather short and stout; dorsal pleural appendage a long, compressed basal arm with the tip almost squarely truncated; ventral pleural appendage longer, slightly curved, broadest basally, the dorsal portion tapering gradually to the acute blackened apex, the surface feebly sculptured; on the ventral face before the tip with a very acute slender appressed spine.

Habitat: Panama.

Holotype, ♂, Porto Bello, February 15, 1911 (August Busck).

Type in the collection of the U. S. National Museum.

This species is evidently allied to *G. maestitia* Alex. of Peru, but is easily distinguished by the wing-pattern and venation. In *maestitia* the sector and  $R_{2+3}$  are very short,  $r$  inserted on the very long  $R_2$ ; deflection of  $R_{4+5}$  distinct, subequal to  $r$  too long, about half of the size  $m$ ; cell 1st  $M_2$  very long and narrow with the basal deflection of  $Cu_1$  at or beyond midlength. This species and *G. laticincta* run close to *G. subhyalina* Alex. and form a group of nearly related insects.

**Gnophomyia olssoni** new species.

Antennæ of the male elongated; wings with a strong pubescence in the apical cells; tibiæ and tarsi whitish.

*Male*.—Length about 3 mm.; wing, 3.3 mm.; antennæ about 2 mm.

The type is mounted in balsam.

Rostrum and palpi dark brown. Antennæ of the male elongated, more than half the length of the body, dark brown; flagellar segments very elongate-cylindrical, densely clothed with abundant stiff, erect hairs; flagellar segments gradually shortened toward the end of the antenna, the last segment about one-third the size of the penultimate. Head brown.

Thorax brown, the pleura more yellowish. Halteres brown, the knobs darker. Legs with the coxæ and trochanters yellowish-brown; femora brown; tibiæ brown passing into whitish at about one-third the length; tarsi whitish, the terminal segments broken. Wings with a strong brown tinge; stigma indistinct; veins dark brown; a very strong but sparse pubescence in the apical cells. Venation (Plate I, Fig. 12):  $Sc$  long, ending just beyond the fork of the sector;  $Sc_2$  at the tip of  $Sc_1$ ;  $Rs$  long, arcuated at origin;  $R_{2+3}$  about one-half the length of the sector;  $r$  oblique, inserted on  $R_2$ ;  $r-m$  long, arcuated; cell 1st  $M_2$  small, closed; basal deflection of  $Cu_1$  nearly opposite midlength of cell 1st  $M_2$ .

Abdomen dark brown, the sternites paler; hypopygium broken.

Habitat: Panama.

Holotype, ♂, Rio Cana, Department of Bocas del Toro, September 25, 1917 (Axel Olsson).

The generic reference may possibly be questioned by some, but there is no other group that can receive this aberrant species. It agrees with *G. luctuosa* O. S. in the strongly pubescent wings, but the elongate antennæ of the male is an unusual feature in the genus. I take great pleasure in dedicating this interesting fly to its collector, my intimate friend, Dr. Axel Olsson.

## A KEY TO THE AMERICAN SPECIES OF GNOPHOMYIA OSTEN SACKEN.

1. A supernumerary cross-vein in cell  $R_2$  or  $R_3$  ..... 2  
 No supernumerary cross-vein in cell  $R_2$  or  $R_3$  ..... 3
2. Cross-vein before midlength of vein  $R_2$  in cell  $R_3$ ; large, wing over 11 mm.; mesonotum orange; abdomen black; wings brown; legs black. (Brazil.) ..... *ruithorax* (Wied.).  
 Cross-vein beyond midlength of vein  $R_2$  in cell  $R_3$ ; small, wing about 5 mm.; thorax black; abdomen dark brownish-black; wings light brown diversified with hyaline and brown; legs light yellow. (Brit. Guiana.) ..... *decisa* Alex.
3. Wings with a strong apical pubescence ..... 4  
 Wings without an apical pubescence ..... 5
4. Coloration black throughout; antennæ of the male short; legs black. (Neotropical, S. Nearctic) ..... *luctuosa* O. S.  
 Coloration brown; antennæ of the male elongated; tibiae and tarsi whitish. (Panama.) ..... *olssoni* n. sp.
5. Cell 1st  $M_2$  open. (Wn. Nearctic) ..... *aperta* Coq.  
 Cell 1st  $M_2$  closed ..... 6
6. Size large, length about 12 mm.; color black except the thorax and abdomen which are orange. (Mexico.) ..... *magnifica* Alex.  
 Size small, length under 10 mm.; coloration not as above ..... 7
7. Wings uniform in color or indistinctly streaked longitudinally with brown and white; not cross-banded ..... 8  
 Wings pale with darker cross-bands or dark with pale bands ..... 14
8. Knobs of halteres yellow ..... 9  
 Halteres dark throughout ..... 10
9. Wings uniformly darkened. (Eastern Nearctic) ..... *tristissima* O. S.  
 Wings longitudinally streaked. (Colorado) ..... *tristissima cockerelli* Alex.
10.  $R_{2+3}$  very strongly arcuated at its origin, almost perpendicular to the sector;  $R_2$  short, not parallel with  $R_3$ . (Brit. Guiana.) ..... *arcuata* Alex.  
 Venation not as above ..... 11
11. Wings infused with a slightly darker band at the cord; thorax black with yellow spots. (Peru.) ..... *maestitia* Alex.  
 Wings hyaline or darkened, uniform ..... 12
12. Coloration dark, black or dark brown ..... 13  
 Coloration rusty red or ferruginous. (Mexico.) ..... *ferruginea* Will.
13. Size small, length about 4 mm.; wings infused with violaceous. (Brazil.) ..... *nigrina* (Wied.).  
 Size larger, length over 6 mm.; wings slightly dusky. (Panama.) ..... *lachrymosa* n. sp.
14. Wings pale with brown bands ..... 15  
 Wings brownish with subhyaline bands ..... 19
15. Vein  $R_2$  very short, straight, not parallel to  $R_3$  ..... 16  
 Vein  $R_2$  long, generally parallel to  $R_3$  ..... 17

16. A basal band in addition to the one at the cord. (Brazil)...**hirsuta** Alex.  
 A dark band at the cord. (Peru, Panama.) .....**pervicax** Alex.
17. Coloration black; wings subhyaline with two dark bands. (Brazil.)  
**osten sackeni** Skuse.  
 Not as above ..... 18
18. Wings brown with a still darker band at the cord .....**maestitia** Alex.  
 Wings subhyaline with a broad indistinct brownish band along the  
 cord; coloration reddish-brown. (Panama.) .....**laticincta** n. sp.
19. Wings brownish with two subhyaline bands. (Brazil.)....**caloptera** O. S.  
 Wings subhyaline with an indistinct hyaline cross-band just beyond  
 the cord. (C. and S. America.) .....**subhyalina** Alex.

Genus **Limnophila** Macquart.

Subgenus **Limnophilella** new subgenus.

Similar to *Limnophila* in the strict sense; wing-venation with the radial sector angulated or spurred at origin; *r* far removed from the tip of  $R_1$ ; basal deflection of  $Cu_1$  before the fork of *M*; 2nd anal cell narrow; halteres very long and slender; tibial spurs of medium size; abdomen elongate.

Type of the subgenus.—*Limnophila epiphragmoides* Alex. (Brazil). The new species described below is congeneric. In practically all the genera and subgenera related to *Limnophila* the basal deflection of  $Cu_1$  is underneath the cell 1st  $M_2$ ; in *Dactylolabis* it is inserted usually at the fork of *M*. In the two species included in this new group the deflection is inserted on *M* far before its fork and I have no doubt of the validity of such a group which may include many species when the fauna of tropical America is better known.

**Limnophila (Limnophilella) victor** new species.

General coloration dark brown including the legs and slender halteres; wings subhyaline with a heavy brown pattern; *Rs* long spurred at origin; petiole of cell  $M_1$  rather long; basal deflection of  $Cu_1$  slightly before the fork of *M*; abdomen with the sternites ringed with brown.

*Female*.—Length, 11.4 mm.; wing, 10.2 mm.; halteres, 2.3 mm. Middle leg, femur, 6.7 mm.; tibia, 9 mm.; hind leg, femur, 7.2 mm.; tibia, 9.8 mm.

Rostrum rather light brown, palpi darker brown. Antennæ dark brown, rather elongate for this sex. Head light colored.

Thorax dark brown, the mesonotal stripes indistinct. Pleura pale testaceous with large indistinct darker blotches. Halteres very long, slender, dark brown throughout. Legs dark brown, the femora a little paler at the base. Wings narrow, subhyaline, with a heavy brown pattern; cells *C* and *Sc* more

yellowish; the large brown markings are well scattered over the disk as shown in the figure; veins brown. Venation (Plate I, Fig. 6): *Sc* long, *Sc*<sub>2</sub> at its tip, ending beyond the fork of *R*<sub>2+3</sub>; *r* removed from the tip of *R*<sub>1</sub>; *Rs* square at its origin and at the angle with a very long spur that is longer than *R*<sub>2+3</sub>; *R*<sub>2+3</sub> a little longer than the basal deflection of *Cu*<sub>1</sub> which is inserted before the fork of *M*; petiole of cell *M*<sub>1</sub> a little longer than *R*<sub>2+3</sub>; *2d A* long, ending opposite the base of the sector; second anal cell moderately broad.

Abdomen elongate, the tergites dark brown; sternites dull yellowish with the segments ringed subbasally and more narrowly apically with brown; valves of the ovipositor short, the tergal valves strongly upcurved, with the tips subacute.

Habitat: Panama (Darien).

Holotype, ♀, Quebrada Richa, a branch of the Rio Tapaliza, a branch of the Rio Pucro, Department of Panama, altitude 1300 feet, July 24, 1918 (Axel Olsson).

This interesting species is allied to *L. epiphragmoides* Alex. (Brazil), but is readily separated by the diagnostic characters given above.

Genus **Epiphragma** Osten Sacken.

**Epiphragma varia** (Wied.).

1828. *Limnobia varia* Wied.; Aussereur. Zweifl. Ins., Vol. 1, p. 573.

One male specimen from the Quebrada Richa, a branch of the Rio Tapaliza, a branch of the Rio Pucro, Department of Panama, Panama, altitude 1,300 feet, July 24, 1918 (Axel Olsson). The species had been recorded only from Brazil.

Genus **Eriocera** Macquart.

**Eriocera columbiana** new species.

Coloration a deep intense black throughout.

*Male*.—Length, about 10.5 mm.; wing, 11.2 mm.; fore legs, femur, 6.6 mm.; tibia, 8.4 mm.; hind leg, femur, 8.3 mm., tibia, 10.8 mm.

Coloration a deep intense black throughout. Thoracic dorsum shiny. Wing broad; *Sc* moderately long, ending before midlength of *R*<sub>2+3</sub>; *r* near the tip of *R*<sub>1</sub> and inserted on *R*<sub>2</sub>; basal deflection of *M*<sub>1+2</sub> a little arcuated, the inner end of cell 1st *M*<sub>2</sub> slightly more proximad than cell *R*<sub>5</sub>; cell *M*<sub>1</sub> lacking; basal deflection of *Cu*<sub>1</sub> inserted at about one-third the length of cell 1st *M*<sub>2</sub>; *Cu*<sub>1</sub> and *Cu*<sub>2</sub> subequal (Plate I, Fig. 8).

Habitat.—Colombia.

Holotype, ♂, Bolivar, December 21, 1916 (E. B. and J. H. Williamson).

**Eriocera argentina** new species.

Coloration black throughout; antennæ short; a narrow gray line around the inner margin of the eyes; wings with cell  $M_1$  lacking.

*Male*.—Length, 11–11.4 mm.; wing, 9.3–10 mm.

Rostrum and palpi black. Antennæ short, black. Head with the frontal tubercle prominent, divided into two parts by a broad median furrow; head black with a narrow gray line surrounding the outer side of the frontal tubercle and continued back around the inner margin of the eye.

Mesonotal præscutum with a sparse gray bloom on the restricted interspaces, the stripes very broad, black; scutum, scutellum and postnotum black. Pleura and coxæ black with a very sparse gray bloom. Halteres and legs black. Wings strongly suffused with blackish; costal region a little darker; veins black. Venation (Plate I, Fig. 7):  $r$  inserted on  $R_2$ , just beyond the fork of  $R_{2+3}$  and near the tip of  $R_1$ ; cell  $M_4$  lacking.

Abdomen black.

Habitat: Argentina.

Holotype, ♂, La Plaza, Province of Catamarca, altitude 2,400 meters, February 18, 1915 (P. Jorgensen).

Paratopotype, ♂.

The types bear the label "on the rivulets."

Genus **Penthoptera** Schiner.

**Penthoptera sanctæ-martæ** new species.

Coloration dark brownish-black; legs dark, the tarsi largely pure white; wings strongly infumed; cell  $M_1$  lacking.

*Male*.—Length, about 6.5 mm.; wing, 8.3 mm.

Rostrum and palpi dark brownish-black. Antennæ rather short, black. Head black with a sparse grayish bloom.

Mesonotum dark brownish-black. Pleura a little grayish. Halteres long, dark brown. Legs with the coxæ and trochanters dark brown; femora dark brown, the extreme bases yellowish; tibiæ dark brown; metatarsi with the basal two-thirds dark brown, on the hind legs less extensive, occupying less than the basal half; remainder of the tarsi, excepting the last two segments, white. Wings with a strong brown tinge, the costal region and the wing-apex a little darker; stigma small, oval, dark brown; veins dark brown. Venation (Plate I, Fig. 9):  $r$  at the tip of  $R_1$ ; deflection of  $R_{4+5}$  obliterated,  $r-m$  being inserted just before the fork of the sector; cell  $M_1$  lacking;  $r-m$  and the inner end of 1st  $M_2$  in alignment; basal deflection of  $Cu_1$  far beyond midlength of cell 1st  $M_2$ ; second anal vein very short.

Abdomen dark brownish-black, the genital segment a little brighter.

Habitat: Colombia.

Holotype, ♂, Santa Marta Mt., December 31, 1916 (E. B. and J. H. Williamson).



In the lack of cell  $M_1$  of the wings, this species is evidently allied to *P. conjuncta* Alex. (Psyche, vol. 21, pp. 44, 45; pl. 4, fig. 2; 1914) of Guatemala; the latter is a larger species (wing over 9 mm.); with the mesonotum yellowish-brown, the præscutum with four dark brown markings, the pleura yellowish; femora yellowish-brown; wings subhyaline with the tip darkened. The venation of the two species is quite distinct, in *conjuncta* the basal deflection of  $R_{4+5}$  being long, cell  $1st\ M_2$  more elongate, with the basal deflection of  $Cu_1$  inserted at about midlength and the second anal vein decidedly longer.

Genus *Tanypremna* Osten Sacken.

*Tanypremna fuscitarsis* new species.

General coloration chestnut-brown, the præscutum with darker brown humeral angles; legs dark brown with only a narrow white band before the tips of the tibiæ; wings subhyaline; abdomen greenish-brown, the tergites banded with paler.

*Male*.—Length, 26.5 mm.; wing, 15.6 mm.

Fore leg, femur, 12.1 mm.; tibia, 12.7 mm.; hind leg, femur, 13.2 mm.; tibia, 14.3 mm.

Frontal prolongation of the head short, pale greenish-white, the rostrum and palpi brown or the latter a little more greenish. Antennæ short, the three basal segments pale yellowish; flagellar segments dark brown. Head pale golden-yellow with a narrow dark brown median line.

Mesonotal præscutum chestnut with a dark brown median stripe; the usual lateral stripes are separated from the median stripe by deep impressed furrows; a triangular yellowish mark on the lateral margins of the præscutum, continued anteriorly along the lateral margin of the median stripe and so cutting off a broad triangular dark brown mark at the humeral angles; scutellum brown, the median area depressed; scutellum pale; postnotum dark brown, the margins pale. Pleura pale greenish-yellow, the dorso-pleural membranes dusky. Halteres pale basally, the knobs dark brown. Legs with the coxæ pale, the outer faces a little infumed; trochanters greenish, a little infuscated beneath; femora dark brown, more greenish basally; tibiæ dark brownish-black, a narrow (1.5 mm.) white band before the broader (about 2.5 mm.) dark tip; tarsi dark brown. Wings in the teneral type, pale, the stigma darker. Venation (Plate I, Fig. 16):  $R_s$  short, straight, oblique, a little shorter than  $R_{2+3}$ ;  $R_2$  running close to  $R_1$ , the cell  $2d\ R_1$  being very long and narrow; deflection of  $R_{4+5}$  short or punctiform; cell  $1st\ M_2$  elongate.

Abdominal tergites greenish-brown with an indistinct pale transverse band at about midlength of the segments; basal tergites with a pale area at the anterior lateral margin; lateral line dark brown; sternites yellow, the apices of the segments brown, the basal segments strongly greenish.

Habitat: Colombia.

Holotype, ♂, Santa Marta Mt., December 29, 1916 (Jesse H. Williamson).

In my key to the species of the genus *Tanypremna* (Journ. N. Y. Ent. Soc., vol. 22, pp. 207, 208; 1914) this species falls naturally into the first group of the genus, *longipes* (Fabr.), *manicata* O. S. and *longissima* (End.) from all of which it differs notably in the uniformly dark-colored tarsi.

***Tanypremna longipes* (Fabr.).**

1805. *Tipula longipes* Fabr.; Syst. Antl., p. 25.

A male from Cristalina, Colombia, February 17, 1917 (E. B. Williamson).

***Tanypremna opilio* O. S.**

1886. *Tanypremna opilio* O. S.; Biol. Cent. Amer., Dipt., Vol. 1, p. 19, Pl. 1, Fig. 2.

A male from Sibube, Department of Bocas del Toro, Panama, June 1, 1917 (Axel Olsson).

Genus ***Brachypremna*** Osten Sacken.

***Brachypremna candida* Alex.**

1912. *Brachypremna candida* Alex.; Journ. N. Y. Ent. Soc., Vol. 20, p. 233.

A few specimens from Guabito, Sixola, Department of Bocas del Toro, Panama, May 24, 1917 (Axel Olsson). The species had hitherto been recorded only from South America.

***Brachypremna unicolor* O. S.**

1887. *Brachypremna unicolor* O. S.; Berl. Ent. Zeit., Vol. 31, Pt. 2, pp. 239, 240.

A few specimens from Sanchez, Santo Domingo, June 7-12, 1915, in the collection of the American Museum.

Genus ***Tipula*** Linnæus.

***Tipula andalgala* new species.**

Belongs to the *monilifera* group; a delicate brown line extending from the front to near the end of the abdomen; antennæ moderately elongated and of a normal Tipuline structure, bicolorous; thoracic dorsum gray; abdomen trivittate and with a brown subterminal ring; female with the wings semi-atrophied.

*Male*.—Length, about 13-14 mm.; wing, 15-15.5 mm.

*Female*.—Length, about 26-27 mm.; wing, 11 mm.

*Male*.—Frontal prolongation of the head moderately long, dull yellow, more brownish laterally; nasus distinct. Antennæ elongate, if bent backward extending about to the base of the abdomen; scape and the first segment of the flagellum dull yellow, the remainder of the flagellum yellow with the basal swelling black, the terminal segments more brownish throughout. Head light gray or yellowish-gray with a narrow dark brown median line extending from the frontal tubercle caudad, somewhat interrupted on the vertex.

Mesonotal præscutum brownish-yellow, narrowly striped with darker brown; a narrow median stripe, broadened behind and attaining the suture; on either side of the middle stripe a pale brown line which evidently represents the outer border of the indistinct intermediate stripe, behind converging and fusing with the middle stripe at the suture; lateral stripes likewise represented only by a narrow dark margin; thoracic interspaces with brown setigerous punctures; scutum gray with the median area narrowly dark brown, a continuation of the median præscutal stripe; a less distinct dark oblique mark on the outer half of the scutal lobes; scutellum buff with a narrow median brown line; postnotum gray with an indistinct median dark brown line. Pleura light gray with indistinct darker markings. Halteres dull brownish yellow, the knobs dark brown. Legs with the coxæ pale yellow, gray pruinose; trochanters dull yellow; femora brownish-yellow, brightened at the base, the apex broadly dark brown; tibia brownish-yellow, the tip narrowly dark brown; tarsi yellowish-brown. Wings with a gray suffusion; costal region brighter yellowish; wings with brown spots and clouds; a brown spot at the arculus; a brown spot before midlength of the distance before the origin of the sector and another at the origin of the sector, these two latter connected in cell *R*; stigma brown, continued down onto the cord; cloudings in the apical cells, along the deflection of *Cu*<sub>1</sub>, in cell *M* at about midlength and in the anal cell. Venation: petiole of cell *M*<sub>1</sub> short, about as long as, or very little longer than, *r*.

Abdomen brownish-yellow, segments seven and eight dark brown; tergites with an indistinct narrow dark brown median line and a narrow dark brown sublateral stripe; extreme lateral margins of the sclerites grayish. Hypopygium with the ninth tergite broadest basally, the sides sloping, the caudal margin with a V-shaped notch; lateral lobes broad, truncated at their apices; a broad dorso-median depression. Ninth pleurite small, complete, at its proximo-ventral angles with a small hemispherical lobe that is covered with a dense pale pubescence and a few long hairs; the outer pleural appendage elongate, pale, with long hairs. Ninth sternite deeply incised on the midline, but connected basally. Eighth sternite with a trifold appendage, the median lobe of which is between two and three times the length of the short lateral lobes and feebly carinate on the ventral face.

*Female*.—Similar to the male, but the abdomen more elongated; the setigerous punctures on the præscutal interspaces more prominent, but the lateral stripes of both præscutum and scutum obsolete. Wings semiatrophied, slightly reduced in length and greatly in width, the pattern and venation distorted. Abdominal tergites with a punctured rectangular area on either side

of the median dorsal stripe, on segments three to seven subbasal in position; dorsal median stripe very broad. Ovipositor with the tergal valves long and slender, acicular, lying almost parallel; sternal valves shorter and deeper.

Habitat: Argentina.

Holotype, ♂, Cerro de Carocal, Catamarca, altitude 3,100 meters, February 17, 1915 (P. Jorgensen).

Allotopotype, ♀.

Paratype, ♂, Andalgalá, Catamarca, altitude 1,000 meters, August 1, 1914 (P. Jorgensen).

This new species belongs to the *monilifera* group of the genus, which has been discussed in some detail by the writer (Trans. Am. Ent. Soc., vol. 42, pp. 23-30, pls. 3-5, 1916) and is of exceptional interest as belonging to the intermediate group of species, falling between the forms with short antennæ and those with elongate organs. In the present species the antennæ are quite normally tipuline in structure; the lateral lobes of the trifid appendage on the eighth sternite are shorter than in *exilis* Alex. (Peru), but longer than in *jivaro* Alex. (Ecuador). The semiatrophied wings of the female sex are interesting.

The specific name, *andalgalá*, is that of a Calchaqui tribe of this region.

***Tipula spinicauda* new species.**

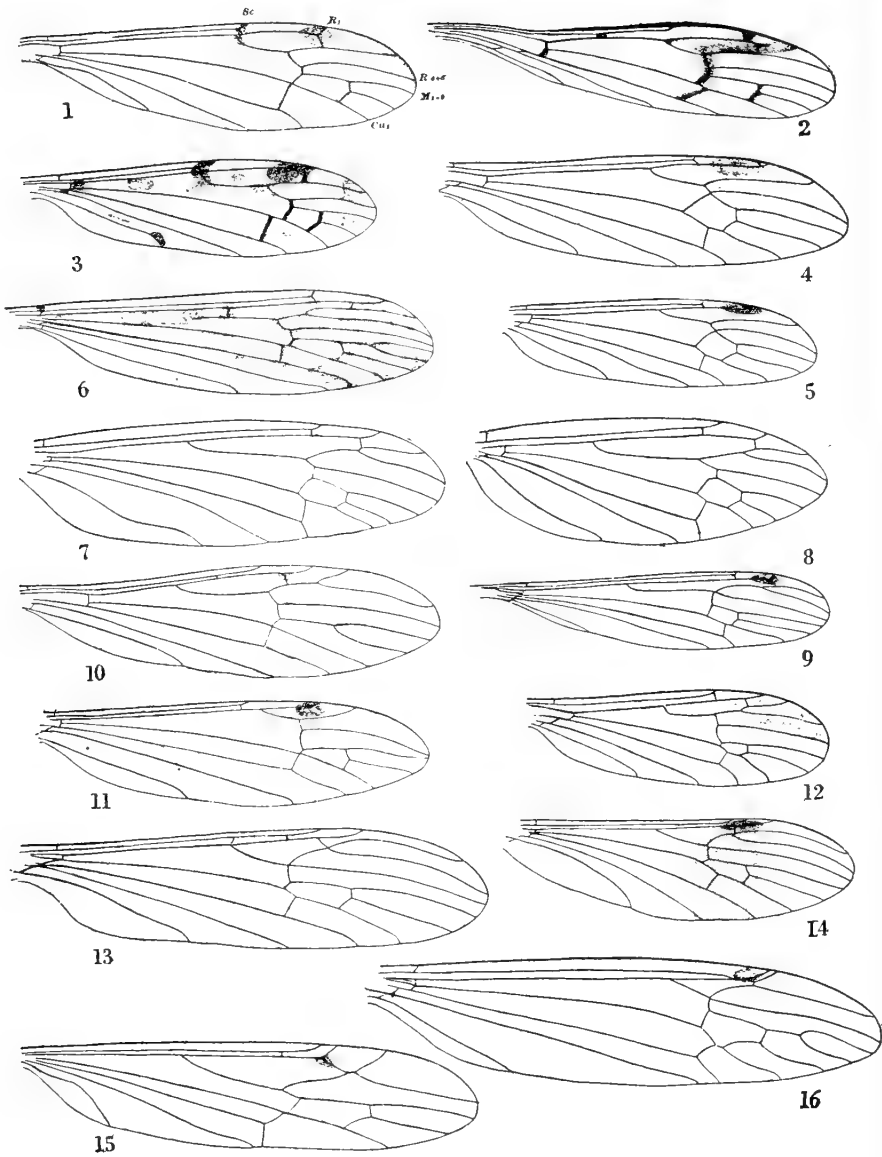
Belongs to the *longitarsis* group; general coloration brown; abdomen reddish-yellow, in the male with a subterminal black ring; wings dusky with the costal region dark brown; male hypopygium with the lateral angles of the ninth tergite produced caudad into straight chitinized arms that are minutely spinulose on their inner faces.

*Male*.—Length, about 14 mm.; wing, 12.5 mm.; antennæ, about 6.5 mm.; fore leg, femur, 9.6 mm.; tibia, 12.1 mm.

Frontal prolongation of the head short, brown, the nasus distinct. Palpi long, brown. Antennæ with the scapal segments dull yellow, the flagellum black, the first segment a little paler at the extreme base; flagellar segments elongated. Head brown.

Mesonotum rich reddish-brown without distinct stripes, the præscutum brighter laterally; scutal lobes darker. Pleura yellowish-buff. Halteres brown. Legs long and slender, the coxæ and trochanters buff, femora dark brown, paler basally; tibiæ and tarsi dark brown. Wings with a decided dusky tinge, cells *C* and *Sc* and the stigma dark brown; apex of the wing in cells *R*<sub>2</sub> and *R*<sub>3</sub> infumed; indistinct brown seams along the veins that include and lie beyond the cord; veins dark brown; small obliterative areas before the stigma, in the end of cell *R*, base of cell 1st *M*<sub>2</sub> and the base of *M*<sub>4</sub>. Venation: *R*<sub>2</sub>





Tipulidæ.

distinct, a little shorter than  $R_{2+3}$ ;  $Rs$  a little shorter than  $R_3$ , petiole of cell  $M_1$  moderate, about as long as  $R_{2+3}$ ; fusion of  $Cu_1$  and  $M_{3+4}$  subpunctiform.

Abdomen reddish-yellow, tergites six, seven, and the basal two-thirds of eight black, the lateral margins reddish, those of segment eight broadly so; sternites similar, segment seven black. Male hypopygium with the ninth tergite extensive, the caudal margin with a deep U-shaped notch, the lateral angles produced caudad into long straight arms that are heavily chitinized at their tips, the inner face minutely and densely spinulose; along the margin of the notch of the tergite these spines are less numerous and much more slender; sides of the tergite with numerous long hairs. Ninth pleurite small, complete; outer pleural appendage a semichitinized curved hook that is swollen basally, blackened at the acute tip; inner pleural appendage irregularly compressed into a flattened blade whose cephalic margin is produced into two short blackened points with a narrow rounded notch between them. Eighth sternite on the caudal margin with a large flattened concave appendage that is almost bifid medially by a deep notch, the surface with a dense white pubescence, on the margin a long spine.

Habitat: Panama (Darien).

Holotype, ♂, Rio Chico, Department of Panama, near the mouth of the Rio Porcona, August 4, 1918 (Axel Olsson).

*T. spinicauda* belongs to the group of *T. longitarsis* Macq. and is to be confused only with *T. appendens* (End.) of Ecuador and *T. tabida* End. of Peru. The latter species has the antennæ bicolorous, the legs brownish-yellow and the eighth tergite black. *T. appendens* has the male antennæ nearly as long as the body (length 9 mm.; antenna 8.5 mm.), the legs brownish-yellow and the wing-pattern and venation distinct. The similar *T. aymara* Alex. (Bolivia) and *T. parishi* Alex. (Brazil) are readily distinguished by the male hypopygia. *T. longitarsis* Macq. has a large brown mark near the middle of the wing-disk on vein *Cu*.

#### EXPLANATION OF PLATE XVII.

- Fig. 1. Wing of *Geranomyia nigripleura* new species.
- Fig. 2. Wing of *Periphereptera subandina* new species.
- Fig. 3. Wing of *Dicranomyia jorgenseni* new species.
- Fig. 4. Wing of *Rhamphidia albitarsis fuscipes* new subspecies.
- Fig. 5. Wing of *Rhamphidia albitarsis fumipennis* new subspecies.
- Fig. 6. Wing of *Limnophila* (*Limnophilella*) *victor* new species.
- Fig. 7. Wing of *Eriocera argentina* new species.
- Fig. 8. Wing of *Eriocera columbiana* new species.
- Fig. 9. Wing of *Penthoptera sanctæ-martæ* new species.
- Fig. 10. Wing of *Gonomyia* (*Gonomyella*) *subcostata* new species.

Fig. 11. Wing of *Gonomyia (Leiponeura) gladiator* new species.

Fig. 12. Wing of *Gnophomyia olssoni* new species.

Fig. 13. Wing of *Gnophomyia lachrymosa* new species.

Fig. 14. Wing of *Gnophomyia laticincta* new species.

Fig. 15. Wing of *Trentepohlia (Paramongoma) sororcula* new species.

Fig. 16. Wing of *Tanypremna fuscitarsis* new species.

Sc = subcosta; R = radius; M = media; Cu = cubitus.

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## OBSERVATIONS ON THE EGG-LAYING OF THE CADDICE-FLY BRACHYCENTRUS NIGRISOMA BANKS, AND ON THE HABITS OF THE YOUNG LARVÆ.<sup>1</sup>

BY HELEN E. MURPHY,

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In the upland bogs near McLean, New York, there is a tributary of Beaver Creek that flows over a sediment-covered bed well shaded by trees, dashes into the open, over rocks and boulders for about fifty rods, then again disappears into the woods. In this restricted open area the square built cases of the larva of the caddis-fly are found attached to the upper surfaces of the stones in mid stream. Mr. J. T. Lloyd studied them here, and published a preliminary account of the habits of this species, with a partial life-history in 1915.<sup>2</sup> It is the purpose of this paper to record some further observations, especially upon oviposition and the habits of the young larvæ.

During the latter part of May, generally on the late afternoon of a clear day, females come out from hiding in crevices of the bark of the trees. Swiftly and warily they fly along the bank, just above the surface of the water. Then one will enter the water, and while

<sup>1</sup> Of the European species, Herr Georg Ulmer in "Die Süßwasser Fauna Deutschlands; Trichoptera," describes the immature stages of *B. subnubilis* and records that it inhabits sluggish waters, rich in plants. The larvæ build square cases at first, but older cases are often found with the corners rounded. The pupal cases are cylindrical. *B. montanus* inhabits rocky streams. The cases are regularly four-sided, made of small slender pieces of sticks, leaves, and bark. The pupal cases are the same kind.

<sup>2</sup> Pomona, Jour. of Ent., 7: 81-86, plate.



entirely or partially submerged, with no air evident clinging to the body, she will excitedly walk around over the stones from three to five minutes. Suddenly she rises and extrudes the egg mass, attaching one end to some support. This accomplished, she slowly and very weakly crawls from the water.

The egg mass, Fig. 10, consists of fifty to one hundred eggs embedded in a gelatinous matrix. The mass is dark-green at first, irregular in shape, three millimeters long by one and one-half wide. It soon swells to about three times its original proportions. A coating of sediment makes concealment almost perfect even while the mass waves to and fro in the current. The egg is dark-green and spherical.

Embryonic development is completed in from twenty-one to twenty-eight days. At the time of hatching, the abdomen starts to straighten, the legs are thrust downward and the chorion is ruptured in the region of the second thoracic segment, diagonally opposite the point of pressure of the legs and abdomen. With the raising of the head, the chorion is split still farther. Biting with the mandibles and pushing with the legs, the larva crawls out, leaving the exuvia inside the chorion. Examination of this cast skin shows a small chitinous tooth in the region of the clypeus. This so-called "hatching tooth," which, according to Siltala, is common to all Trichoptera, apparently is not functional in this species.

The larvæ leave the egg mass at once, hastily scramble over stones and sticks into the quieter eddies close to the bank. There they feverishly set about case building. Chewing off a piece of plant material here, gathering a bit of bark or root fiber there, covering all with a generous supply of silk, they fashion splendid little cases. After the first row, which is more or less circular at first and is altered later, they are square in cross section. The larva holds the case with the mesothoracic legs, puts the silk-coated material in place with prothoracic legs, and tightly shoves it down with the metathoracic legs. Then the larva turns to the next side and puts on a piece of material there and so proceeds to each side in turn.

The cases are completed in about five hours. The larvæ then start to eat. For the first two weeks the food consists entirely of diatoms such as *Meridion*, *Cymbella*, *Navicula*, *Cocconema*, *Fragil-*

*laria* and *Synedra*. This food they obtain by browsing on the stones and vegetation over which they hastily scramble. At the end of the third week the green algæ *Edogonium*, *Cladophora*, *Ulothrix*, *Cylindrospermum*, and bits of seed plants are added to the diet.

At the end of the sixth week, the larva is about three-sixteenths of an inch in length. It now possesses gills and a full armature of spines on the legs, such as is shown for front and middle legs in figures 5 and 7. The earlier condition of these same legs is shown in figures 4 and 6 of the plate. The larvæ now leave the quiet eddies along the bank, and concentrate on the upper surface of the current-swept boulders. There, with one edge of the front end of their cases firmly cemented to the stones, they face the current. With head thrust slightly forward, prothoracic legs extending straight ahead, mesothoracic legs upward, and metathoracic legs at the sides (figs. 1, 2), they wait for food.

From a purely herbivorous diet obtained by active searching, they now become mainly carnivorous, waiting in a most receptive attitude for whatever may come within their powerful grasp. An examination of the stomach contents at this time reveals small quantities of diatoms, slightly larger amounts of the algæ and tissue of higher plant and, by far the greatest in bulk, animal food such as May-fly nymphs of the genus *Heptagenia* and *Ephemera*, Hydrachnids, Chironomid larva, small Crustacea, and even *Brachycentrus* larvæ. Fig. 12 is a diagram of the alimentary tract of a larva collected the latter part of September, when the predominance of animal food was at its maximum. Compared with that of a younger larva five weeks old (fig. 11), it shows the fore intestine enlarged and somewhat constricted in the center. The mid intestine is shorter and narrower, while the hind intestine is larger and relatively longer.

The spinning glands are very well developed, even when the larva leaves the egg mass. At the base of the labium the two glands join into a common chitinated duct which forms the silk press. This leads to an opening at the tip of the labium.

In the laboratory, larval habits were best observed by using a piece of thin glass tubing one-half inch in diameter. This was heated and carefully flattened on the top to prevent aberration. Inside the tube fine sand and small stones were attached to the bottom by means of commercial glass cement. A cap of ordinary window

screen fastened over the rear end of the tube prevented the larvæ from escaping and did not hinder the attachment of rubber tubing for an outlet. At the other end was fitted another piece of tubing which connected with a small glass funnel. This funnel was fastened just under the faucet. The desired amount of water could be easily regulated at any time, and the funnel furnished a means of introducing food.

Larvæ introduced into the stream passing through this tube soon attached their cases and assumed their characteristic attitude. Others were artificially fastened to stones in various positions. So long as the larvæ were facing the current, the legs were in the normal position. It did not seem to make much difference whether the larvæ were right or wrong side up in their cases. One specimen stayed ventral side up for over a week before it took the trouble to turn over. Those larvæ that did not face the current, after vain attempts to detach their cases, left them, and proceeded to build new ones. These they attached in the characteristic manner.

The larvæ apparently fail to recognize any food that is not moved into their grasp. *Cyclops* and water fleas, when held in the stream just in front of the larvæ, were absolutely ignored; but when allowed to float down with the current, were quickly seized and devoured. A waterflea, fully one-half the length of a larva was grasped and hugged bear-fashion by the legs that are all armed with powerful curved claws and strong spines (figs. 5, 7). Two very tough Hydrachnids suffered a like experience with the same larva. They were torn in pieces by the strong mandibles armed with sharp teeth (fig. 9) with a speed and regularity that well may be compared with a saw-mill.

*Brachycentrus* larvæ when placed in still water will assume their characteristic attitude of out-stretched legs. With *Cyclops* and water fleas within easy reach, passing to and fro, in and out of the case, not the slightest attempt was made to obtain a morsel. The current again started, however, the first unsuspecting intruder was caught and greedily devoured.

The spines on the femur of the meso- (fig. 7) and metathoracic legs (very similar) may serve as plankton sieves. Finely powdered carmine introduced into the stream could be seen strained and caught on these. Then the short spines and row of long straw-colored hairs

on the inner edge of the femur of the prothoracic legs (fig. 5) were used to scrape off the particles and transfer them to the mouth parts. A subsequent examination of the stomach revealed the presence of the carmine there.

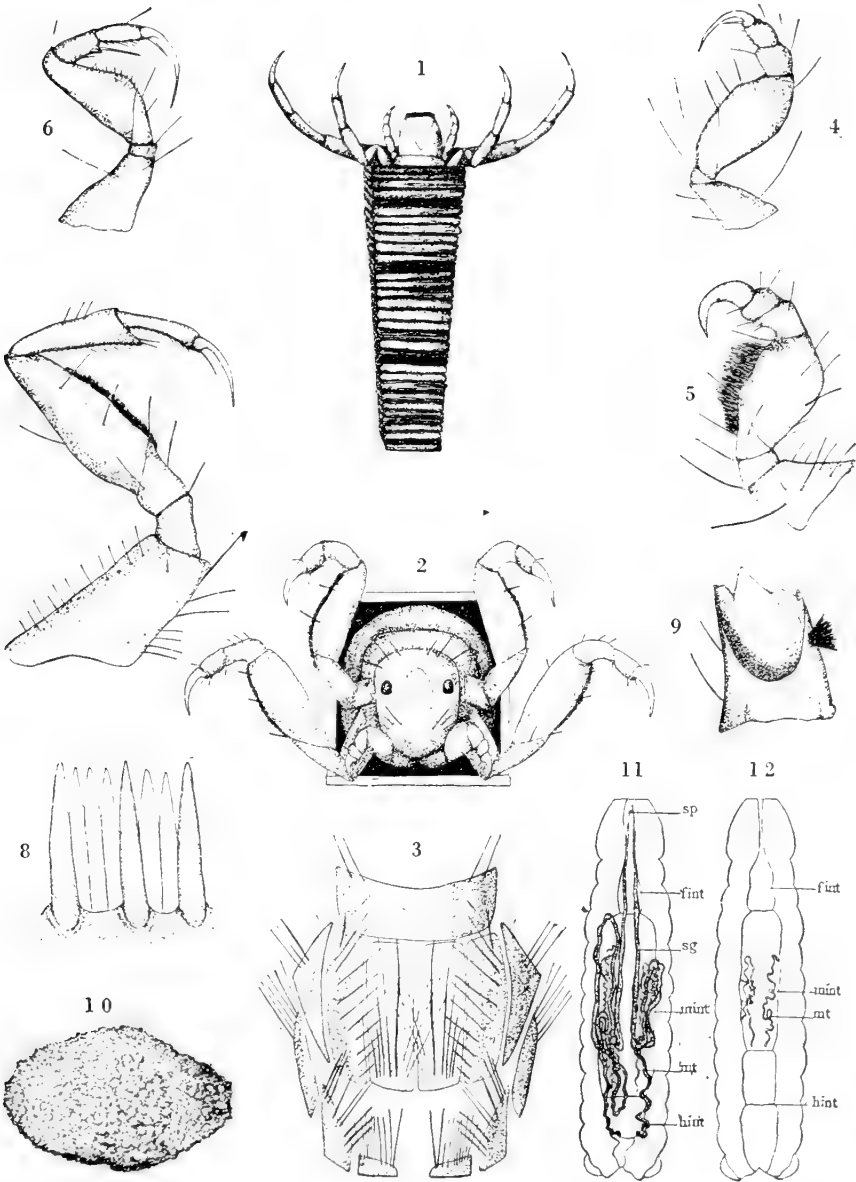
When a quantity of material, such as bits of plant tissue, pieces of wood, bark, or silt, was introduced into the stream, the larvæ would rear themselves out of their cases far enough to expose the entire thorax, and proceed to comb it with the mesothoracic legs in a single swift stroke. Then the prothoracic legs were used to remove the material and convey it to the mouth-parts, where it was as eagerly chewed as though it were the daintiest of morsels. Examination of the thorax (fig. 3) shows heavily chitinized pieces on the dorsum of the meso- and meta-thorax, bearing long forward projecting spines which overlap diagonally, forming a sort of meshwork above the thorax at the head end of the case. In-as-much as this habit seems prevalent, only at those times when the water contains a large amount of sediment and fine débris, it seems probable that the primary reason for this action is to keep the passageway open for a good stream of water through the case, and that the food-getting is a secondary matter and quite incidental.

Through the winter the larvæ feed but little, and then on diatoms mainly. With the lowering of the water after the spring freshets, during the middle of April, the larvæ fasten their square cases firmly to the stones. Then they feverishly set about spinning a silken sheet of lining, that is perforated in the center, at both ends. These tough cases may persist two or three seasons after the occupants have finished with them. Secure within their cases, the larvæ gradually go into a deep sleep and peacefully dream of becoming caddice-flies.

#### EXPLANATION OF PLATE XVIII.

##### **Brachycentrus nigrisoma** Banks.

- Fig. 1. Dorsal aspect of larva in attitude of waiting for prey.
- Fig. 2. Front aspect of larva in attitude of waiting for prey.
- Fig. 3. Diagram of thorax of larva.
- Fig. 4. Prothoracic leg of larva three weeks old.
- Fig. 5. Prothoracic leg of larva four months old.
- Fig. 6. Mesothoracic leg of larva three weeks old.
- Fig. 7. Mesothoracic leg of larva four months old.
- Fig. 8. Part of comb of mesothoracic leg of larva, in detail, four months old.



*Brachycentris nigrisoma* Banks



Fig. 9. Mandible of larva.

Fig. 10. Egg mass.

Fig. 11. Diagram of alimentary canal of larva five weeks old; *fnt*, fore intestine; *mint*, mid intestine, *hint*, hind intestine; *mt*, malpighian tubule; *sq*, spinning gland; *sp*, silk press.

Fig. 12. Diagram of alimental canal of larva four months old, spinning glands removed.

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## FALL NOTES ON SOME ALABAMA BUTTERFLIES.

BY LEWIS B. WOODRUFF,

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It so happens that comparatively little has found its way on record concerning the butterflies to be found in that part of our country comprised within the boundaries of the state of Alabama. In the belief that the little I am able to offer toward supplying this lack may prove of interest, the following notes are submitted respecting those species met with during a short visit to the south-central part of that state in the late fall of 1918.

The exact locality was a plantation home in the midst of wide acres under cultivation in the so-called black-belt, four or five miles beyond the settlement of Hazen which lies about seventy miles southwest of Montgomery. Here I spent the last ten days of October and the first week in November, housed by almost continuous rains accompanied by chill winds. But occasionally there would be sunshine for an hour or so, rarely all day; and although the season of flowers was past, the few wild asters along the fences being soon stripped of their blooms by the storms, butterflies of certain species abounded, fluttering over the grass everywhere. Perhaps the most abundant was *Eurymus corytheme* Bdv., form *amphidusa* Bdv., showing a wide range in the proportionate extent of the orange and yellow suffusion, with here and there a female of the white form corresponding to the white female of *E. philodice* Godt. of our northern meadows. The latter species was also present, although in comparative scarcity. A close rival in abundance to *E. corytheme*, and hovering over the grass in close association with it, was *Eurema euterpe* Men., familiar to us in the neighborhood of this city. This genus was represented by four species, all of them door-yard fliers,

*Eurema euterpe*, referred to above, *E. delia* Gram., flying with it though not nearly so numerous, and in the field hard to distinguish from it until captured, so rapidly does it move its wings with the tell-tale band on the primaries' lower margin. And as for the *delia* females I suspect that many a specimen was overlooked, being misled by its *euterpe*-like dress. *E. jucunda* Bdv. all but escaped me too, looking like a faded *delia*; while *E. nicippe* Cram., the fourth, demanded sharp attention to differentiate the occasional example from the hosts of male *Eurymus eurytheme*. Of the Hesperids *Pyrgus tessellata* Scud. was distinctly a meadow species, very abundant, rarely rising in its flight above the tops of the grasses, that is, above eight or ten inches from the ground surface, and from the freshness of many of the specimens noted evidently a brood just emerged. *Lerodea eufala* Edw. was also taken in the grass; but *Atalopedes campestris* Bdv. was found only on the aster blossoms, which disappeared during the last week in October. Another species that proved especially partial to the asters was *Dione vanillæ* Linn., most numerous, and in life with the most brilliant red coat of any of our red butterflies. It was a constant joy to see them clinging to the swaying stems, generally two or more on the same flower spray, or fluttering in their quest for a more tempting feast. *Phyciodes tharos* Dru. was everywhere in the grass; *Vanessa virginiensis* Dru., better known to most of us as *huntera*, was another old acquaintance, but by no means common; while in the fields *Euptoieta claudia* Cram., a very few *Danaus archippus* Fab., and an occasional ubiquitous *Pieris rapæ* Linn. were noted. The dry limerock road in front of the house had its frequenters too, including *Polygonia interrogationis* Fabr., and the little peacock *Junonia cænia* Hubn. Close to the house in a bed of garden asters *Papilio cresphontes* Cram. lingered too long for his own good; while flying high overhead, bound for other parts, black swallow-tails were sometimes seen, of which the only one taken proved to be *P. philenor* Linn.

My most important observations however were the following, one having to do with a new record for the section treated of, the other with an interesting manifestation of instinct in a common southern species. On the fourth of November, a bit further afield than I was wont to wander, I saw what I supposed was a tailed *Polygonia*, but having netted it discovered I had taken an *Anca*, presumably *portia*



Fabr., and I so labelled it. Upon consulting the books for the recorded range of that species after my return north, and becoming more than doubtful of the correctness of my identification, I brought it over to the American Museum, and there sought the good offices of Mr. Frank E. Watson, with the result that we may now add a state as far southeast as Alabama to the known range of *Anca andria* Scud., heretofore given as comprising the Mississippi Valley west to Texas.

My other observation has to do with *Catopsilia cubule* Linn. Throughout my stay, day after day, whenever the rain would let up, these rather heavy but withal swift fliers were passing overhead from a little west of north to a little east of south, apparently in a bee line for the Florida peninsula. Never in a swarm, sometimes fifteen or more minutes apart, they passed by ones, twos, threes, in a continuous stream; never aimlessly fluttering about, never changing their general direction, but high up in air, usually far beyond reach of my net, and with remarkable speed, they journeyed almost in the teeth of the prevailing southeasterly wind, with every indication of consciously seeking a definite distant goal. I had almost despaired of netting any of them, until during the first week in November I discovered that a large ochra planting, in full bloom back of the house, would occasionally tempt one or two to turn aside from the business in hand and for a brief space settle to a draught from the deep corolla of their blooms. And I know of no butterfly, no matter how protectively marked its under surface, that so perfectly melts into its resting place as does *cubule* when sipping the nectar from these blossoms, the match in shade and seeming texture being so exact. In this patch of ochra, by dint of patient waiting, a considerable series was taken, including several males of the color-form *senna* Linn. But those that escaped me never lingered long at the feast, soon rejoining the straggling cavalcade they had left, apparently intent on reaching warmer climes before the threatening frosts should overtake them. A migration was evidently in progress, one shared in by no other species, and persisted in by this frail and delicate looking butterfly in spite of an adverse head wind.<sup>1</sup>

<sup>1</sup> Since the above was written Mr. Charles W. Leng has kindly called my attention to an almost exactly similar observation of a migratorial flight of this butterfly at Fayette Court House, 110 miles northwest of Hazen, by Mr. John M. Davis, which was recorded in *Insect Life*, III, p. 335.

NOTES ON THE NORTH AMERICAN SPECIES OF  
HIPPODAMIA (COLEOPTERA).<sup>1</sup>

BY P. H. TIMBERLAKE,

HONOLULU, T. H.

The writer has been studying our North American species of *Hippodamia* for several years past, and presents the results of his studies at the present time as a solicitation for additional material much needed to complete the work. Our species have been studied from a new angle with gratifying result, namely by the aid of characters residing in the male genitalia. The writer has carried on extensive breeding work also with several of the species, which has thrown much light on the extent of variation in the thoracic and elytral markings.

Before proceeding further it might be well to review briefly the work of other writers during the last two decades. Colonel Casey has produced two important articles<sup>2</sup> on our species, and has done much in elucidating and describing not a few of the western forms. Although his work can not be considered conservative and is not entirely free from errors of identification it has done much to stimulate other workers. It is apparent now that some of his species are merely forms or geographical races which may be recognized as subspecies. Mr. Leng<sup>3</sup> on the other hand appears to the writer to be somewhat too conservative in his treatment of the species so that the actual status of our forms in a general way lies somewhere between the extremes set up respectively by him and Colonel Casey. Another important contribution to the knowledge of our species is R. A. Johnson's "Determinate Evolution in the Color Pattern of the Lady-beetles."<sup>4</sup> Mr. Johnson attacks the subject from the standpoint of the experimental biologist and is much less successful in his taxonomic treatment. On this account his treatment of *Hippodamia con-*

<sup>1</sup> Contributions from Experiment Station, H. S. P. A.

<sup>2</sup> JOURN. N. Y. ENTOM. SOC., Vol. 7, pp. 61-169, June, 1899; Canad. Entom., Vol. 40, pp. 393-421, Nov., 1908.

<sup>3</sup> JOURN. N. Y. ENTOM. SOC., Vol. 11, pp. 35-45, pl. 4, Mar., 1903.

<sup>4</sup> Carnegie Inst. Washington, Publ. No. 122, pp. i-iv, 1-104, figs. 1-92, June, 1910.

*vergens* is preposterous and the biological data and conclusions drawn therefrom are vitiated by the fact that he confused at least six valid species under this name, viz., *convergens*, *moesta*, *extensa*, *15-maculata*, *5-signata* and *lecontei*. His treatment of the other species is more conservative and for the most part not open to this objection.

It is also necessary to consider the status of the genus *Spilota* Billberg<sup>5</sup> to which Mr. H. S. Barber has called the writer's attention as a possible substitute for *Hippodamia*. Apparently this genus was validly proposed and is open to use. Billberg included at least eight described species with references to Schönherr<sup>6</sup> although he gave no description. The genus was proposed as a segregate of *Coccinella* and included those species known to Billberg which on the whole were more slender and spotted than those remaining in *Coccinella*. So far as the writer can determine this was practically Billberg's sole conception of his genus, sufficiently vague as it may seem. The genus has never been recognized or brought into use by subsequent authors and it seems advisable to reach some conclusion at this time concerning its status, whether to suppress it definitely as a synonym if that is possible, or let it replace some later name.

In selecting a genotype for *Spilota* it seems best to pursue the same course that would be applicable if it had been long in use, that is to consider all subsequent genera as its segregates. This procedure in some cases may distort the author's conception of the genus in question, but on the other hand is less liable to upset the current nomenclature. Pursuant to this course we find that after *Anisosticta*, *Megilla*, *Hippodamia*, *Adonia* and *Aphidecta* with their validly included species have been excluded from consideration there is only one species left in Billberg's list, viz., *11-punctata*. This species is therefore definitely chosen as the genotype of *Spilota* Billberg, although it may be observed that the first species of the list, *19-punctata*, the genotype of *Anisosticta*, probably conforms the most closely to Billberg's conception. *11-punctata* of Billberg and Schönherr is evidently Linné's species<sup>7</sup> and a slightly aberrant *Coccinella*, so that *Spilota* thus sinks as a synonym of *Coccinella* Linné. This may not seem quite just when *Spilota* was proposed as a segregate

<sup>5</sup> Enumeratio Insectorum in Museum Billberg, p. 61, 1820.

<sup>6</sup> Synonyma Insectorum, Vol. 1, pt. 2, p. 185, 1808.

<sup>7</sup> Systema Naturæ, p. 366, 1758.

of *Coccinella* and included species which have been relegated to other genera by all modern writers, yet Billberg's work was too indefinite and obscure to be taken too seriously, and the writer feels that few workers will object to seeing the name suppressed, instead of being revived for such long-established genera as either *Anisosticta* or *Hippodamia*. Billberg's use of the name, however, invalidates *Spilota* Burmeister, 1844, a segregate of *Anomala*, which must sink as a homonym.

**Hippodamia** Chevrolat.

*Hippodamia* Chevrolat, in Dejean's Cat. Coleop., ed. 1833, p. 432, 1833 (or 1834?).

Type of genus: *Coccinella 13-punctata* Linné, designated by Crotch.<sup>8</sup>

Our North American species may be divided into four natural groups by means of the male genitalia as follows:

*13-punctata* group. *Ædeagus* slender, bent almost double upon itself, a little thickened just beyond the bend, its dorsal, subapical flaps small and membranous; lateral lobes of the theca (tegmen of Sharp and Muir<sup>9</sup>) unusually large and wide; the posterior lobe of theca abruptly bent downward at the apical third and provided with a distinct chitinized plate beneath, which bears a rather long, linear lobe on each side at the posterior corners, and a pair of median lobes, much longer, reaching nearly to the apex of the theca and frequently after drying bent abruptly outward at their middle.

*Parenthesis* group. *Ædeagus* slender, moderately bent in a half circle or a little more, enlarged or somewhat thickened at the dorsal, subapical flaps which are triangular in shape and rather well chitinized; lateral lobes of theca slender; the posterior lobe of theca rather small and narrow, its apex produced into a slender, simple or barbed point.

*Convergens* group. *Ædeagus* slender, moderately curved, not thickened or hardly so at the dorsal, subapical flaps, which are more or less membranous and linear; lateral lobes of theca slender; the posterior lobe of theca generally wider and more depressed than in the preceding group, its apex merely acute or produced into a slender, simple point.

<sup>8</sup> Revision of the Coccinellidæ, p. 94, 1874.

<sup>9</sup> The Comparative Anatomy of the Male Genitalia Tube in Coleoptera, Trans. Entom. Soc. London, 1912, pp. 477-642, pl. 42-78, Dec., 1912.

*Glacialis* group. *Ædeagus* much thickened throughout, generally bent nearly double upon itself, the dorsal, subapical flaps strongly chitinized except at apex, and undergoing various modifications in shape, but never exactly as described in the preceding groups; lateral lobes of theca slender; the posterior lobe of theca rather large, broad and considerably deeper than in the *convergens* group, its apex with an obliquely inclined portion limited by a strongly developed transverse keel, which is either straight or deeply emarginate.

### *13-punctata* Group.

#### 1. *Hippodamia tibialis* (Say).

*Coccinella tibialis* Say, Journ. Acad. Nat. Sci. Philadelphia, Vol. 4, p. 94, 1824.

*Hippodamia 13-punctata* of American writers, not Linné.

This is the only species of the group in North America and although very closely allied to *13-punctata* (Linné) of Europe it seems to be sufficiently distinct. In *13-punctata* from Spandau, Prussia (Th. Pergande), the posterior lobe of the theca is abruptly widened close to the apex, its sides in dorsal view meet in a right angle at the apex and are slightly emarginate. In *tibialis* the posterior lobe is only slightly and gradually widened near the apex, its sides are straight and meet more acutely at the apex. Strange as it may seem at first thought, a male from Gifu, Japan (Y. Nava), exhibits the *tibialis* character slightly more accentuated even than in North American specimens. The writer has studied the genitalia of *tibialis* from St. Anthony Park, Minnesota (R. A. Vickery); Madison, South Dakota (R. A. Vickery); Tower City, North Dakota (Miriam W. Reeves) and from Taylorsville, Utah (P. H. Timberlake).

### *Parenthesis* Group.

#### 2. *Hippodamia parenthesis* (Say).

*Coccinella parenthesis* Say, Journ. Acad. Nat. Sci. Philadelphia, Vol. 4, p. 93, 1824.

*Coccinella tridens* Kirby, Fauna borealis-Americana, pt. 4, p. 229, 1837.

In this species the posterior lobe of the theca is not compressed beneath and its apex is produced into a short, barbed point. The genitalia have been examined in specimens from West Springfield, Massachusetts (H. E. Smith); Hagerstown, Maryland (J. A. Hyslop); Tower City, North Dakota (Miriam W. Reeves); Fort

Collins, Colorado (C. R. Jones), and Murray, Utah (W. L. Bevon). The species is remarkably constant on the whole throughout its range, and there seems to be no tendency toward the formation of geographical races.

3. *Hippodamia lunatomaculata* Motschulsky.

*Hippodamia lunatomaculata* Motschulsky, Bull. Soc. Imp. Nat., Moscow, Vol. 18, p. 382, pl. 7, fig. 8, 1845.

*Hippodamia parenthesis* in part of Crotch, Casey, Leng, Johnson, etc.

SUBSPECIES OR VARIETIES:

*Hippodamia apicalis* Casey, Journ. N. Y. Entom. Soc., Vol. 7, p. 81, 1899.

*Hippodamia parenthesis expurgata* Casey, Canad. Entom., Vol. 40, p. 400, 1908.

This species is distinguished from *parenthesis* by having the posterior lobe of the theca strongly compressed beneath, its apex truncate with a slender, median, unbarbed point. The writer has examined specimens of this species from Tillamook, Wilsonville and Forest Grove, Oregon (Creel and Rockwood); Salt Lake City, Utah (P. H. Timberlake); Evenston and Lyman, Wyoming (E. J. Vosler). A species as found in the lowlands of the Pacific Coast in California and Oregon has been confused with *parenthesis*, as the elytral markings are practically the same, although there is some difference in the thoracic markings as pointed out by Johnson. In the interior and Rocky Mountain region it has become differentiated into a sufficiently distinct geographical race or subspecies, described by Casey under the name of *apicalis*. Casey's *expurgata* on the other hand seems to the writer to be hardly more than an individual variation, although it may possibly have become stabilized in some restricted localities. A fairly large proportion of the specimens from Tillamook, Oregon, are of this variety, the rest being typical *lunatomaculata*, with intermediate forms.

The writer has crossed *parenthesis* from Utah with *lunatomaculata* from Oregon and has found the union perfectly fertile in all cases. The genitalia of the resulting offspring is almost exactly intermediate between those of the parent species. Although the range of these two species overlap considerably in the Rocky Mountain region there is no evidence to show that they thus interbreed in nature. Since male *Hippodamia* are not at all adverse to mating with any female they find, even if belonging to another species, it would be too much

to suppose that mating between *parenthesis* and *lunatomaculata apicalis* never takes place in nature. Such unions, however, are probably relatively rare, and in the case of any one female its results might well be nullified by the prepotency of the much more frequent intraspecific matings.

The writer has also examined the genitalia of a third species belonging to this group from Mineral King, Tulare County, California, in the collection of Dr. E. C. Van Dyke, but the specimen is not at hand for description. It is a heavily vittate form intermediate between typical *apicalis* and *lengi* Johnson, and may prove to be the latter species. Much more material in this group is needed, however, from the mountains of California and other parts of the West before our knowledge of *lengi* and its variations is complete.

### *Convergens* Group.

The species allied to *convergens*, so far as their genitalia have been studied, may be separated as follows:

1. Posterior lobe of theca without a small, acute tooth on each side near apex.<sup>2</sup>  
 Posterior lobe of theca with a small, acute tooth on each side near apex, beyond which it slopes downward and backward to an acute, slightly produced point, and is somewhat longitudinally furrowed on its dorsal surface, the concavity being most pronounced between the subapical teeth .....4. *sinuata* Mulsant.
2. Posterior lobe of theca without a transverse carina .....4  
 Posterior lobe of theca with a transverse carina a little beyond the middle .....3
3. Posterior lobe narrow, triangularly tapering from base to apex; its dorsal surface in front of carina slightly concave, the surface beyond the carina sloping downward and produced into a rather long, slender process as seen from above, but in side view continuous with the strongly compressed concave sides of the under surface.  
 5. *15-maculata* Mulsant.  
 Posterior lobe rather short and wide, its lateral margins as seen from above slightly convex to near the apex, then abruptly narrowed and produced into a short, acute point; its dorsal surface in front of the carina somewhat concave, but beyond the carina sloping downward to the apex; the under surface somewhat compressed especially towards the apex. ....6. *cockerelli* Johnson.
4. Posterior lobe of theca comparatively large or about as long as the basal part .....5

Posterior lobe short and thick or about one-half as long as the basal part of theca, its dorsal surface plane except on the apical part where it is slightly convex; the lateral margins parallel until near the apex, where they abruptly converge and meet in an acute point; the under surface not compressed and provided with a short, rounded membranous flap on each side near the base, which usually projects so as to be visible in dorsal view .....7. **lecontei** Mulsant.

5. Posterior lobe of theca rather narrow, with subparallel margins arcuately converging near apex which is produced into a short, rather slender process; the dorsal surface of lobe somewhat convex, the under surface depressed; the dorsal, subapical flaps of ædeagus obliquely truncate at apex, the apical portion of ædeagus about twice as long as the flaps.

8. **convergens** Guérin.

Posterior lobe of theca wider than in *convergens*, the lateral margins as seen from above moderately arcuate, the apex produced into a rather long, slender process; the dorsal, subapical flaps of ædeagus rounded at apex, the apical portion of ædeagus about one-half longer again than the flaps .....9. **moesta** Leconte.

#### 4. **Hippodamia sinuata** Mulsant.

*Hippodamia sinuata* Mulsant. Spécies des Coléoptères trimères sécuripalpes, p. 1011, 1851.

*Hippodamia trivittata* Casey, Journ. N. Y. Entom. Soc., Vol. 7, p. 81, 1899.

SUBSPECIES OR VARIETIES:

*Hippodamia spuria* Leconte, Proc. Acad. Nat. Sci., Philadelphia, vol. 13, p. 358, 1861.

*Hippodamia complex* Casey, ibidem, p. 80.

*Hippodamia crotchii*, Casey, ibidem, p. 80.

*Hippodamia americana* Casey (not Crotch), ibidem, p. 80.

This species is decidedly variable and it is divisible so far as it has been studied by the writer into three well-marked subspecies. One, the typical *sinuata* (*trivittata* Casey) is found in the marshes of San Francisco Bay and along the Sacramento River in California. The second is the Oregon race described by Leconte as *spuria*, distinguished by the heavy, more or less transverse postmedian spots and the expanded sutural spot. *Crotchii* and *complex* of Casey seem to be individual variations connecting with typical *sinuata*, as no proof has been advanced to show that they have become established races. The third race is that found in Utah and Colorado, distinguished from *spuria* by the paler coloration, being generally suffused with yellowish in life, the scutellar spot narrow and often



prolonged to the middle or beyond, the humeral, postmedian and sub-apical spots small and generally separate, although the postmedian pair are not infrequently united. This subspecies has not been named apparently and may be called *Hippodamia sinuata disjuncta* n. subsp., described from thirty-one type and paratype specimens from Salt Lake City and Murray, Utah. Casey described it under the name of *spuria* and his *americana* (not Crotch) seems hardly more than an individual variation. The type of *disjuncta* will be placed in the U. S. National Museum.

5. **Hippodamia 15-maculata** Mulsant.

*Hippodamia 15-maculata* Mulsant, *Spécies des Coléoptères trimères sécuripalpes*, p. 20, 1851.

This species which is often confused with *convergens* has the genitalia very distinct from any other species. Two males have been examined, one from Badger, Nebraska (W. C. Colt), and the other from Batchawaung Bay, Lake Superior, Ontario (Hubbard and Schwarz).

6. **Hippodamia cockerelli** Johnson.

*Hippodamia cockerelli* Johnson, *Carnegie Inst. Washington*, Publ. 122, p. 49, fig. 33, 1910.

The type of this species in the U. S. National Museum has been studied and it has been the only specimen examined.

*Oregonensis* Crotch and *dispar*, *lilliputana* and *puncticollis* of Casey have not been studied. They all seem to be closely related, and some of them if not all are likely to prove to be forms of one species to which *cockerelli* may also belong.

7. **Hippodamia lecontei** Mulsant.

*Hippodamia lecontei* Mulsant, *Spécies des Coléoptères trimères sécuripalpes*, p. 1010, 1851.

This species seems to be distributed throughout the Rocky Mountain region, but does not appear to be readily divisible into geographic races. Specimens with the basal bar broken up into a scutellar and the humeral spots occur in most localities apparently in about equal numbers with the form having the basal bar complete. *Mulsanti* Leconte, *abduccens* Casey and *bowditchi* Johnson are probably forms of this species. It is frequently mistaken for *H. 5-signata* (Kirby).

8. *Hippodamia convergens* Guérin.

*Hippodamia convergens* Guérin, Iconogr. Regne Animal, p. 321, 1846.

This species throughout its vast range from the Atlantic to the Pacific and from Washington and Massachusetts southward into Mexico is remarkably constant and the writer has not discovered the slightest tendency toward the formation of geographic races. A small percentage of the beetles in any part of its range has the elytral spots reduced or even altogether absent, and much more rarely the thoracic discal spots are absent. Another uncommon variation is that in which the postmedian spots are somewhat enlarged and united, and sometimes even the outer postmedian spot may be found jointed with the subapical spot. The writer has never seen an individual in which the inner postmedian and subapical spots have become united, but this variation presumably occurs occasionally, and Casey's *juncta*, therefore, is probably nothing but an individual variant of *convergens*. On one occasion at Salt Lake City, Utah, a pair of *convergens* were reared from larvæ collected on a sunny bank in the early spring, which have the scutellar and postscutellar spots united and enlarged to form a broad subcrescentiform band extending back nearly to the inner postmedian spots. From these beetles a large series was bred, which contained both normally and abnormally marked individuals. In some of the latter the band has become jointed with the humeral spots and in others with the inner postmedian spots. All these variations probably occur but little more frequently if at all in the Western States than in the Eastern. Johnson's statement, therefore, that *convergens* "flies to pieces" in the West is entirely erroneous, and based upon his confusion with *convergens* of some five other species.

9. *Hippodamia moesta* Leconte,

*Hippodamia moesta* Leconte, Proc. Acad. Nat. Sci. Philadelphia, Vol. 7, p. 19, 1854.

This species which is apparently confined to the North West Coastal region is most closely related to *convergens* in the genitalic characters. The writer has examined one male from Monroe, Washington, in the collection of Dr. E. C. Van Dyke.

*Glacialis* Group.

The four species belonging in this group may be separated as follows:

1. The transverse keel near apex of the posterior lobe of theca deeply emarginate .....2  
 The transverse keel not emarginate; the posterior lobe of theca rather thick dorsoventrally, more nearly terete than in the other groups, tapering gradually from the base to the keel and then more abruptly to the acute apex; its dorsal surface rather flat, the apical portion sloping downward and backward from the margin of the keel.....10. *5-signata* (Kirby).
2. Emargination of the transverse keel rounded.....3

Emargination of the transverse keel acutely angled; the posterior lobe of theca of the same general shape as in *5-signata*, but as seen from above the lateral margins are slightly emarginately rounded and somewhat expanded at the ends of the keel; its dorsal surface longitudinally grooved, the area enclosed within the emargination of the keel in the form of a rather deep, rounded depression; the apical portion obliquely inclined from the margin of the keel, the apex of the emargination reaching nearly two-thirds of the distance to the apex of the lobe.

11. *extensa* Mulsant.

3. Posterior lobe of theca much as in *5-signata*, but a little wider, more depressed, less tapering toward the apex and wider at the transverse keel; its dorsal surface slightly longitudinally grooved in the middle on the basal part, the area enclosed by the keel somewhat obliquely inclined, but hardly concave; the apical portion obliquely inclined from the margin of the keel, the apex of the emargination reaching about one-half of the distance to the apex of the lobe; dorsal flaps of ædeagus linear, rounded and membranous at apex, but heavily chitinized at base, the apical part of ædeagus nearly three times as long as the flaps.

12. *glacialis* (Fabricius).

Posterior lobe of theca as in *glacialis* except that the keel is a little more deeply and more broadly rounded emarginate, the lateral margins as seen from above nearly parallel as far as the obliquely inclined apical part; dorsal flaps of ædeagus chitinized throughout, a little broader toward the base, and somewhat emarginate on the inner side just before the apex, the apical part of ædeagus about twice as long as the flaps.

13. *Hippodamia* sp. indet.

10. *Hippodamia quinquesignata* (Kirby).

*Coccinella 5-signata* Kirby, Fauna borealis-Americana, pt. 4, p. 230, pl. 7, fig. 1, 1837.

This species is extremely variable and has become segregated into numerous geographical races of which the following have been studied:

*Hippodamia coccinea* Casey, Canad. Entom., vol. 40, p. 395, 1908.

*Hippodamia vernix* Casey, Journ. N. Y. Entom. Soc., vol. 7, p. 79, 1899.

*Hippodamia utcana* Casey, Canad. Entom., vol. 40, p. 397, 1908.

*Hippodamia convergens*, var. *caseyi* Johnson, Carnegie Inst., Washington, Publ. 122, p. 21, 1910.

*Hippodamia ambigua* Leconte, Proc. Acad. Nat. Sci., Philadelphia, vol. 6, p. 131, 1852.

*Hippodamia obliqua* Casey, Journ. N. Y. Entom. Soc., vol. 7, p. 79, 1899.

*Hippodamia politissima* Casey, ibidem, p. 80.

*Hippodamia punctulata* Leconte, ibidem, p. 131.

*Hippodamia ambigua* of authors, not Leconte.

Besides those enumerated above it is likely that *subsimilis* Casey and perhaps *leporina* Mulsant belong here.

Of the typical *5-signata* only one female from Escanaba, Michigan (Hubbard and Schwarz) has been studied, but the pronotal and elytral markings are so similar to certain of the western subspecies and varieties that there is hardly a question but what it is correctly placed with them. This and the subspecies of the Rocky Mountain region are characterized by the heaviness of the elytral markings in varying degrees and in some forms by the brilliancy of the ground color. Of *coccinea* a male from Buena Vista, Colorado (Hubbard and Schwarz) has been studied. Of *vernix* specimens from Mullan and Helena, Montana (Hubbard and Schwarz); Moccasin, Montana (S. J. Snow); and Buhl, Idaho (L. P. Rockwood) have been examined. Specimens of *utcana* have been studied from Enterprise, Utah (T. R. Chamberlin) and Kaysville and Salt Lake City, Utah (P. H. Timberlake).

*Utcana* was found in the vicinity of Salt Lake City quite infrequently during the summers of 1913 to 1915. None was seen in the summer of 1913, one male only was found on alfalfa in the fall of 1914, but in July, 1915, some half a dozen specimens were discovered among great numbers of *convergens* and *sinuata disjuncta* on the flowers of poison hemlock infested with *Aphis heraclei* Koch. All that were found in 1915 were brought to the laboratory and kept under observation for weeks. It is interesting to note that two or three of the females proved to be infertile when captured, thus substantiating the rarity of the species in that locality. From these specimens a good series was reared, showing an interesting amount of variation. Some of the beetles, except for the more brilliant coloration

tion and somewhat smaller size, were rather like typical *5-signata*. The single specimen taken in 1914, however, verged toward the subspecies *caseyi* of Washington. *Uteana* also ranges westward to the mountains of California, as the form figured by Essig in his *Injurious and Beneficial Insects of California*, under the name of *lecontei*, seems to belong here.

As we proceed westward we find the forms of *5-signata* characterized by a gradual obliteration of the elytral markings, until on the Pacific Coast we encounter the spotless subspecies, *ambigua* and *punctulata*. In the case of *ambigua* this condition is coupled with enlargement of the white discal marks on the pronotum, and with the reduction or even the total obliteration of these marks in the case of *punctulata*. In the interior valleys of Washington, however, we find the small-spotted subspecies, *caseyi*, in which the spots are arranged much as in *convergens*. So similar indeed is the arrangement, shape and size of the spots that some specimens cannot be separated from *convergens* with any degree of certainty, unless the student takes cognizance of the male genitalia. During the summer of 1915 the writer crossed *uteana* with *punctulata* and thus produced a form similar to *caseyi*, but with the elytral spots still further reduced or in part absent. The scutellar and postscutellar spots proved to be the most constant in the hybrid offspring.

Of *caseyi* the writer has examined numerous specimens from Pullman, Washington (G. I. Reeves), and Wenatchee, Washington (E. J. Newcomer). This form, as mentioned above, might easily pass for *convergens*. Mr. Newcomer found it and *convergens* about equally abundant at Wenatchee. *Ambigua* is abundant in parts of Oregon and the writer has seen many specimens from Forest Grove, McMinnville, Wilsonville and Millsboro of that State (Creel and Rockwood), and one specimen from Vancouver, Washington (G. I. Reeves), which belongs here rather than with *caseyi*. *Punctulata* is extremely common in the lowlands of California and the writer has examined large series from Berkeley, Milbræ, Sacramento, Pasadena, Whittier, San Diego, etc. (P. H. Timberlake). It has been called *ambigua* universally in recent years, although the true *ambigua* is the subspecies later redescribed by Casey under the name of *obliqua*, of which *pollitissima* seems to be either a synonym or a minor variation.

11. *Hippodamia extensa* Mulsant.

*Hippodamia extensa* Mulsant, Spécies des Coléoptères trimères sécuripalpes, p. 15, 1851.

This species probably has the most limited range of any North American species, as apparently it is confined to the salt marshes of San Francisco Bay region, California. The writer has examined specimens from Alameda and Milbræ (E. C. Van Dyke).

12. *Hippodamia glacialis* (Fabricius).

*Coccinella glacialis* Fabricius, Systema Entomologiæ, p. 80, 1775.

*Coccinella abbreviata* Fabricius, Mantissa Insectorum, p. 54, 1787.

*Coccinella remota* Weber, Observationes entomologicæ, p. 49, 1801.

This common Eastern species has been examined from Melrose Highlands and Forest Hills, Massachusetts (P. H. Timberlake); West Springfield, Massachusetts (H. E. Smith); Salisbury, North Carolina (R. A. Vickery); and Tower City, North Dakota (Miriam W. Reeves).

13. *Hippodamia* species.

One male from Soda Springs, Idaho, remains undetermined. It runs to *subsimilis* in Casey's tables, and may possibly be that species, although *subsimilis* on the other hand might as likely prove to be a form of *5-signata*.

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## ON THE GENUS RHODESIELLA C. F. ADAMS (DIPTERA).

BY M. BEZZI,

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In 1905 Mr. C. F. Adams erected the genus *Rhodesiella* for a small South African fly collected in Rhodesia, near Salisbury, January, 1901, by Mr. Frank L. Snow. The new genus was placed in the family Agromyzidæ, but nothing was said about its natural affinities; the name has subsequently appeared only twice in the dipterological literature, besides the citation in the Zoölogical Record for 1906, vol. XLIII, p. 391. It was conserved by me in the family Agromyzidæ in my Catalog of the African Diptera (1908, p. 194), but Prof. Melander has removed it to the Milichiinæ in his table of the genera of the subfamily (1913, p. 237).

Through the kindness of Mr. Chas. P. Alexander I have recently received for examination the type of *Rhodesiella tarsalis* Ad., and with the greatest interest I have noted that it is the same fly as described by Prof. de Meijere under the name of *Merosciniis scutellata* (1908, p. 172), as collected in Java, near Semarang, also in the month of January, by Mr. Jacobson. The fly has subsequently been found in other localities of the Oriental Region, and has also been recorded by Becker (1910, p. 432) from the Ethiopian Region. I have, indeed, received it from Ghinda, Erythræa, by Dr. Alb. Mochi. The only difference is that the Rhodesian type-specimen has the third antennal joint nearly black above, while usually it is entirely yellow.

The fly belongs to the family Chloropidæ, subfamily Botanobiinæ (= Oscininæ, = Oscinellinæ, = Oscinosominæ). The family was evidently mistaken by Adams on account of the rather developed fronto-orbital bristles, which are also present in some other genera of the Chloropidæ, but they are inserted near the sides of an evident frontal triangle. In the original diagnosis of this genus, Adams has described, however, the apical spinous tubercles of the scutellum, a feature which is eminently characteristic of the natural group of flies to which the insect in reality belongs, while it is wanting in the Agromyzidæ and related groups.

Spinous tubercles or spines on the scutellum are an uncommon feature in the so-called acalyptrate flies. They are found only among the Borboridæ, in the genus *Notacanthina*, erected in 1835 by Macquart for the *Scatophaga bispinosa* of Wiedemann; in the Thyreophoridæ; in some Heleomyzidæ, such as *Snillia oxyphora* Mik; in the Rhopalomeridæ, chiefly in the genus *Rhinotora* Schiner; in some Ortalidæ of the subfamily Platystominæ, like the genus *Peltacanthina* Enderlein; in the Diopsidæ; but chiefly in the numerous forms of the Chloropidæ which are grouped around the cosmopolitan genus *Crassiseta*.

In his specific description Adams has, moreover, recorded (p. 198) the deep angle formed by the fourth longitudinal vein at the hind cross vein, a character which is well figured by de Meijere in his original figure (Pl. IV, fig. 14).

Since the type species of the genus *Rhodesiella*, *R. tarsalis* Adams, 1905, is the same insect as the type species of the genus *Merosciniis*,

*M. scutellata* de Meijere, 1908, there can be no doubt but that the name *Rhodesiella* Adams, 1905, must be employed in place of the name *Meroscinis* de Meijere, 1908.

The Chloropid genus *Rhodesiella* is a very important one, being widely spread over the Oriental and Ethiopian Regions, with rather numerous species, as may be seen from the following list:

*Rhodesiella* Adams 1905 (= *Meroscinis* de Meijere 1908),

Sp. typ. *tarsalis* Adams 1905 (= *scutellata* de Meijere 1908).

A. From the Oriental Region (arista always pubescent).

a. Scutellum short, rounded at end, with less developed tubercles.

1. *R. meijerei* Becker (1911, p. 92) .....Java.

2. *R. tibiella* Becker (1911, p. 90) .....Ceylon.

3. *R. latipennis* de Meijere (1913, p. 297) .....Java.

b. Scutellum a little more elongate, but rounded at tip, with less developed tubercles.

4. *R. finitima* Becker (1911, p. 92) .....Formosa and New Guinea.

c. Scutellum elongate, triangular or rectangular, as a rule with more developed tubercles.

5. *R. tarsalis* Adams (1905, p. 198) (= *scutellata* de Meijere 1908, p. 172, Pl. IV, fig. 14) .....Java, Sumatra, Singapore, Formosa.

6. *R. nitidifrons* Becker (1911, p. 93) .....Assam, Java, Formosa.

7. *R. sexseta* de Meijere (1913, p. 295) .....Java.

8. *R. dimidiata* Becker (1911, p. 91) .....Formosa.

9. *R. elegantula* Becker (1911, p. 89) .....Java, Sumatra, Formosa.

10. *R. quadriseta* de Meijere (1913, p. 296) .....Java.

11. *R. conica* Becker (1911, p. 89) .....Java.

12. *R. recta* Becker (1911, p. 91) .....Formosa.

13. *R. pellucida* Becker (1911, p. 92) .....Java.

14. *R. albiseta* Becker (1911, p. 93) .....Java.

B. From the Ethiopian Region.

a. Arista pubescent, wings hyaline.

5 bis. *R. tarsalis* Ad. (*scutellata* de Meij.),

Abyssinia, Erythraea, German East Africa, Rhodesia.

15. *R. aeneifrons* Lamb (1912, p. 332, fig. 19, Pl. XVI, figs. 6-7),

Seychelles.

16. *R. rugosa* Lamb (1917, p. 333, Pl. XVI, fig. 8) .....Seychelles.

12 bis. *R. recta* Becker .....British East Africa.

b. Arista pubescent, wings spotted or infuscated.

17. *R. plumigera* (Loew 1860) Becker (1913, p. 156),

Abyssinia, Caffraria.

18. *R. cuneata* Becker (1913, p. 156) .....Abyssinia.

19. *R. confluens* Becker (1913, p. 157) .....Abyssinia.

20. *R. infumata* Becker (1913, p. 158). Abyssinia, British East Africa.



c. Arista quite bare, wings infuscated or even hyaline.

21. *R. bicolor* Becker (1910, p. 431) ..... German East Africa.
22. *R. annulata* Becker (1910, p. 432) ..... German East Africa.
23. *R. kovicsi* Becker (1913, p. 158) ..... Abyssinia.

It is not certain that all the above listed species are valid and distinct, or whether they belong to one or different genera.

Since the genus *Rhodesiella* is widely spread over the tropical countries of the Old World, its presence in tropical America may be suspected. Indeed, Becker (1912, p. 129) has stated that the Brazilian *Onychaspidium sexdentatum* Enderlein (1911, p. 196, fig. 4) is a species of *Rhodesiella* (*Meroscinis*); but Enderlein (1913, p. 361) contends that his genus is a sufficiently distinct one, even believing that my African genus *Elaphaspis*, 1912, may be the same. Moreover, Enderlein at the same place (1913, p. 361) has said that his own *Leptopeltastes longiscutellata* (1911, p. 229) from Brazil is a *Rhodesiella* (*Meroscinis*); he also says (pp. 361-362) that the Oriental *Meroscinis meijerei* and *M. tibiella* both belong to his Brazilian genus *Coryphisopteron* (*Discogastrella*).

It is interesting to note that in the subfamily Botanobiinae, the species having spinous tubercles on the scutellum increase in number from the temperate to the tropical countries, and are represented by vicariant forms in the Oriental, Ethiopian and Neotropical Regions. While the cosmopolitan genus *Crassiseta* (and in Europe the nearly related genus *Myrmecomorpha* = *Elachiptera* s. str.) is the only one which has species in the Palæarctic and in the Nearctic Regions, there are in the warmer parts of Asia, Africa and America numerous forms in which the scutellum shows a very extraordinary shape, or bears very long spiniform tubercles. In the following table these forms are enumerated, region for region, and going from those with less developed scutellar tubercles to those in which this feature is more intensively marked.

Oriental Region.	Ethiopian Region	Neotropical Region.
<i>Crassiseta</i> .	<i>Crassiseta</i> .	<i>Crassiseta</i> .
<i>Rhodesiella</i> .	<i>Rhodesiella</i> .	<i>Leptopeltastes</i>
<i>Thyridula</i> .		<i>Coryphisopteron</i> .
<i>Prionoscelus</i> .		<i>Laxobathmis</i> .
<i>Nomba</i> .		<i>Enderleiniella</i> .
<i>Epicelyphus</i> .		<i>Pentanotaulax</i> .
<i>Discyphus</i> .	<i>Elaphaspis</i> .	<i>Acanthopeltastes</i> .
<i>Dactylothyrea</i> .	<i>Cyrtomomyia</i> .	<i>Onychaspidium</i> .

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## CICADAS OF THE GENERA OKANAGANA, TIBICIN- OIDES AND OKANAGODES, WITH DESCRIP- TIONS OF SEVERAL NEW SPECIES.

BY WM. T. DAVIS,

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The genus *Okanagana* probably contains more species of cicadas than any other in North America, and they are also in many instances quite hard to separate. In the northeastern part of the continent there appear to be only two species, but in the central and western parts it is far otherwise, and in California they are very numerous. As a rule the individuals of the same species resemble one another quite closely in color pattern, but occasional variation is seen, especially when the species is rather widely distributed. In his Preliminary Review of the West Coast Cicadidæ, published in the JOURNAL OF THE N. Y. ENTOMOLOGICAL SOCIETY, March, 1915, Mr. E. P. Van Duzee states that the "structural characters are very few in some of the genera, notably *Okanagana*, and I have been obliged to fall back upon color characters in the preparation of the key. The color and markings, while variable in extent, are quite constant in general facies for each species." A considerable number of species have been made known since 1915, but it will be some time before our collections are sufficiently complete to warrant the statement as to the exact number.

In considering the genus *Okanagana* it became necessary to first

identity Say's *Cicada rimosa*, described in 1830, and designated as the type of his genus *Okanagana* by Mr. Distant in 1905. We hope that we have successfully accomplished this, and the conclusions reached are to be found in the remarks on *rimosa*.

The original description of the genus *Okanagana* was published in the Annals and Magazine of Natural History, Seventh Series, Volume XVI, pp. 23, 190, 1905, and is as follows: "Head (including eyes) considerably narrower than base of mesonotum and almost equal to its length (including cruciform elevation); front shorter than vertex, its apex more or less emarginate, vertex centrally sulcate; pronotum about as long as head, its anterior angles in a line with eyes, its posterior angles dilated; abdomen in male longer, in female about as long as space between apex of head and base of cruciform elevation; tympana completely exposed, tympanal coverings entirely absent; face more or less centrally sulcate; rostrum reaching the intermediate coxæ; opercula small, transverse; abdomen beneath with the lateral margins broadly recurved; tegmina and wings hyaline; tegmina with the basal cell about or almost twice as long as broad, apical areas eight; wings with six apical areas. Type, *O. rimosa* Say (*Cicada*)."

The genus *Tibicinoides* was described by Mr. Distant in the Annals and Magazine of Natural History, Series 8, Vol. XIV, p. 166, Aug., 1914, and Uhler's *Tibicen cupreo-sparsus* was designated as type. Some of the characters mentioned are "tegmina and wings semiopaque; tegmina with the basal cell about twice as long as broad; apical areas short in length, eight in number, a curved rudimentary vein, curved inwardly, crossing tegmen from base of first ulnar area to base of lower apical area; posterior tibiæ with a few fine spines." While the fore wings in *Okanagana mercedita* and *O. minuta* are not colored as in *cupreo-sparsus*, the short apical areas show the three species to be related, and they may in the future be placed in the genus *Tibicinoides* as indicated in the table.

Owing to the length of the marginal cells Uhler's *Cicada hesperia* has been placed in the table near *striatipes* and *utahensis*, which it also resembles in some other features, instead of in the genus *Tibicinoides*, where its color pattern would place it.

In the table for the separation of species the natural sequence could not be followed in every instance, but we hope that it will serve to identify the members of this difficult group. In order to study these Cicadas the specimens should be spread so that the venation, the character of the basal cell of the fore wing and the color of the basal membranes can be seen. If the wings on one side, preferably the left, are expanded, it will suffice. Cicadas dry very quickly on the stretching board and freshly captured individuals need remain thereon only about a week, and those that have been relaxed in a softening box a still shorter time. In *Tibicen*, *Cacama* and most of the other genera of North American cicadas the uncus is withdrawn by the insect into the abdomen, but in *Okanagana*, *Tibicinoides*, *Clidophleps* and *Platypadia* it is always exposed. Often it can be fully examined without changing its position, but if the end be bent downward and concealed by the valve, the uncus should be lifted upward when the insect is mounted on the stretching board. A portion of a match can be inserted with a forceps between the uncus and the valve until the parts are dry, or the uncus may be simply lifted up with a pin.

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## LIST OF SPECIES.

<i>Okanagana.</i>	<i>synodica</i> (Say)
<i>cruentifera</i> (Uhler)	<i>balli</i> Davis
<i>magnifica</i> Davis	<i>rubrovenosa</i> Davis
<i>mariposa</i> Davis	<i>vanduzeei</i> Distant
<i>vandykei</i> Van Duzee	<i>vanduzeei</i> var. <i>consobrina</i> Distant
<i>lurida</i> Davis	<i>vanduzeei</i> var. <i>californica</i> Distant
<i>ornata</i> Van Duzee	<i>striatipes</i> (Haldeman)
<i>napa</i> Davis	<i>utahensis</i> Davis
<i>schaefferi</i> Davis	<i>hesperia</i> (Uhler)
<i>occidentalis</i> (Walker)	<i>pallidula</i> Davis
<i>bella</i> Davis	<i>uncinata</i> Van Duzee
<i>rimosa</i> (Say)	<i>mercedita</i> Davis
<i>canadensis</i> (Provancher)	<i>minuta</i> Davis
<i>tristis</i> Van Duzee	(Males not known.)
<i>arctostaphylæ</i> Van Duzee	<i>hirsuta</i> Davis
<i>canescens</i> Van Duzee	<i>rotundifrons</i> Davis
<i>viridis</i> Davis	<i>Tibicinoides.</i>
<i>aurantiaca</i> Davis	<i>cupreo-sparsus</i> (Uhler)
<i>fratercula</i> Davis	<i>Okanagodes.</i>
<i>oregona</i> Davis	<i>gracilis</i> Davis
<i>triangulata</i> Davis	

## KEY TO THE SPECIES OF THE GENERA OKANAGANA AND TIBICINOIDES.

A. Male uncus not hooked at extremity, sometimes sinuate.

B. Expanse of fore wings more than 50 mm.

C. Base of fore and hind wings orange red more or less variegated with black.

D. Outer edge of fore wings forming a somewhat straight line.  
Very large species.

Pronotum all black; mesonotum with orange, discal spots; front margin of fore wings bright orange to end of radial cell, slightly darker beyond; venation not thickened; blood-red at base of both pairs of wings; notch in last ventral segment of female double. Expands 70-75 mm. ....**cruentifera** (Uhler)

Pronotum all black; mesonotum black except at sides; front margin of fore wings bright orange to first marginal cell; venation thickened, especially about the marginal cells; notch in last ventral segment of female simple. Expands about 80 mm. ...**magnifica** new species

Pronotum narrowly edged on sides and posterior margins with rufus; venation not at all thickened. Expands about 75 mm. ....**mariposa** Davis

*DD.* Outer edge of front wing of a more continuous curve.

Medium sized species, except *schaefferi*, which is large.

*E.* Legs almost entirely orange or greenish in color. Abdomen pale beneath including the rather long valve.

Pronotum mostly pale with a black median vitta gemmate anteriorly, the lateral oblique grooves more or less broadly black. Two broad pale marks extending from the anterior extremities of the mesonotal  $\times$ ; a rather dull colored species with the uncus deeply cleft at extremity. Expands about 70 mm. ....**vandykei** Van Duzee

Pronotum as in *Vandykei*; mesonotum reddish straw color, black centrally; tergum black with posterior edge of the segments pale. A shining species with the uncus seen from above shallowly noticed at the extremity, and sinuate on lower margin when seen in profile. Expands a little over 60 mm. ....**lurida** new species

Head, pronotum and mesonotum almost entirely black, front margin of fore wing bright orange to the end of radial cell; basal cell opaque. Expands about 60 mm. ....**ornata** Van D.

Head, pronotum and mesonotum black, much variegated with dull orange; venation of fore wings uniformly light in color, basal cell clear; tergum shining black with the segments narrowly margined with orange posteriorly. A larger headed species than the last, and with a shorter uncus. Expands about 60 mm. ....**napa** new species

*EE.* Legs, especially the front pair considerably blackened.

*F.* Shining species with rather broad wings, and the hind margin of pronotum orange or reddish.

Front of head strongly produced; pronotum edged on sides and hind margin with orange, hind margin of abdominal segments both above and beneath orange. Last segments of abdomen beneath with short scattered pubescence. Expands about 75 mm. (Except in size this and *fratercula* resemble each other, and some specimens that may belong to the last named species are much larger than the type.)....**schaefferi** Davis

Venation of the fore wings fuscous, except the costal margin, which is often narrowly edged with black, but otherwise greenish-

orange to the end of the radial cell; subcostal vein black. Basal cell clear or nearly so. Pronotum edged on hind margin and at posterior angles and sometimes narrowly on sides with greenish-orange. Head small rather blunt in front, and proportionately broader than in the next species, very hairy on dorsal surface and with a considerable amount of rather long hairs behind the eyes; beneath thickly clothed with whitish hairs. Last ventral segment of female doubly notched. Expands about 60 mm. .... *occidentalis* Walker

Of a slightly blueish tint, otherwise colored about as in the last species, but the costal margin of the fore wings to the end of the radial cell often bright orange, the basal cell clouded sometimes blackened. Pronotum usually plainly edged with orange on sides as well as on hind margin. Head not as blunt when viewed from above as in *occidentalis*, proportionately narrower and with little hair behind the eyes, also less hairy beneath. Last ventral segment of female not doubly notched, or second notch but feebly indicated. Expands about 60 mm. .... *bella* new species

*FF.* Dull bodied species or at most feebly shining, with proportionately narrower wings, and the hind margin of pronotum orange or reddish, except in *tristis* where it is black. Dorsum of the abdomen often with conspicuous transverse rows of short silvery hairs.

Basal cell of fore wings slightly clouded, pronotum blackish mottled each side with testaceous, the hind margin and sides reddish. Tergum with the posterior edges of the segments reddish, the vestiture more sparse than in *canadensis* and more in the nature of hairs. Expands about 60 mm.

*rimosa* (Say)

Venation of the fore wings often thickened; basal cell clouded and blackened. Pronotum usually entirely black, except the hind margin which is testaceous, sometimes



clouded each side with reddish; tergum black with much tomentum, which when removed leaves a smooth surface. A black species with the usual four orange spots before the mesonotal X, and orange membranes at the base of both pairs of wings. Expands about 62 mm.

**canadensis** (Provancher)

Venation about as in *canadensis*, but the veins not thickened. Pronotum generally all black, but sometimes mottled with dull red each side of the center. Further distinguished from the other two species in this section by having the abdomen beneath centrally pale. Expands about 70 mm.

**tristis** Van D.

CC. Base of the fore and hind wings not of the usual orange red variegated with black.

Color rufo-ferruginous including the venation of fore and hind wings, with a few marks on the vertex and a dorsal vitta on the tergum black. Expands about 70 mm.

**arctostaphylæ** Van D.

Body almost entirely black; basal cell of the fore wings clear; membranes at base of both pairs of wings whitish.

Expands about 65 mm. ....**canescens** Van D.

Body and wing venation nearly entirely green; basal cell of fore wings clear. Expands 65 mm. ....**viridis** Davis

Body and wing venation nearly entirely orange; basal cell of fore wings clear; a black band between the eyes, and a conspicuous dorsal band of the same color extending from the hind margin of the pronotum to the end of the abdomen. Expands about 55 mm. ....**aurantiaca** Davis

BB. Expanse of fore wings 50 mm. or less; orange variegated with black at base of both pairs of wings. (Some examples of *fratercula* exceed 50 mm.)

G. Pronotum in mature individuals black centrally margined with orange especially behind. In *triangulata* the grooves of the pronotum are sometimes orange colored.

Basal cell of fore wings darkly opaque, abdomen black beneath with hind margins of segments reddish. A dark colored species. Expands about 47 mm. **fratercula** Davis

Basal cell and venation of fore wings yellowish; abdomen yellowish beneath with numerous silken hairs; front of head and eyes not prominent. Expands about 50 mm.

**oregona** Davis

Basal cell of fore wings translucent; abdomen yellowish be-

neath with silken hairs very short or absent; front of head and eyes prominent. Expands about 50 mm.

**triangulata** Davis

GG. Pronotum in mature individuals black with the central portions variegated with orange or yellow. Basal cell of fore wings yellowish or translucent.

Head small, front prominent; discal yellow marks extending from the mesonotal  $\times$  to the front margin of the mesonotum. The veins surrounding the first seven marginal cells of fore wing infuscated. Expands about 42 mm.

**synodica** (Say)

Membranes at base of fore and hind wings pinkish, remainder of wing venation yellowish. The W mark on the front portion of the mesonotum separated from the mesonotal  $\times$ ; tergum darker, the terminal segments nearly all yellow as in *synodica*. Expands about 46 mm.

**balli** new species

AA. Male uncus hooked at extremity.

B. Rather slender bodied species with the venation of fore and hind wings colored almost uniformly throughout.

Black clothed with minute dark rufus hairs giving the insect a dull reddish aspect. Expands about 55 mm.

**rubrovenosa** Davis

BB. Stouter bodied species, the fore and hind wings variegated with orange and black at the base.

C. Third marginal cell more than one half as long as second ulnar area adjoining and immediately behind it.

D. Expand about 55 to 60 mm. Black species with basal portions of fore and hind wings orange variegated with black.

E. Front of head not conspicuously produced; under side of abdomen with very numerous long silken hairs.

F. Abdomen black above or nearly so in var. *californica*.

Almost wholly black above, pronotum dull rufus, particularly on the sides; abdomen beneath with the central area black, except the reddish or yellowish posterior margin of each segment; valve black on under side. Expands about 60 mm.

**vanduzeei** Distant

Dorsal markings much lighter, especially about the mesonotal  $\times$ ; abdomen beneath with a black spot on each segment except

the last. Expands about 55 or 60 mm.

**vanduzeei** var. **consobrina** Distant

Dorsal markings of the pronotum still more extended and confluent; beneath, abdomen almost entirely yellowish, valve yellowish. Expands about 57 mm.

**vanduzeei** var. **californica** Distant

**EE.** Front of head conspicuously produced; silken hairs on under side of abdomen short and inconspicuous.

Dorsal surface with much appressed golden pubescence; abdomen black and yellowish above, and usually entirely yellowish beneath. Basal cell usually transparent. Expands about 53 mm.

**striatipes** (Haldeman)

Dorsal surface with the hairs more upright than in *striatipes*, which it much resembles in markings. Dorsum of abdomen black, beneath central area usually black with hind margins of segments reddish. Basal cell darkened. Expands about 60 mm. .... **utahensis** new species

**DD.** Expand about 52 mm., usually much less.

**G.** Fore and hind wings, except marginal cells, infuscated. Uncus when viewed from behind with hook terminating in a broadly rounded notch. Expands about 52 mm. .... **hesperia** (Uhler)

**GG.** Fore and hind wings clear except at extreme base, where the membranes are orange.

Yellowish or yellowish green; front conical and prominent. Expands about 50 mm.

**pallidula** Davis

Smaller and darker than the last; head small; front not so prominent. Venation approaching the next two species. Expands about 42 mm.

**uncinata** Van Duzee

**CC.** Marginal cells short; the third one in fore wings about one half as long as second ulnar area adjoining and immediately behind it.

**H.** Both pairs of wings clear except near base.

Head including eyes about 5 mm. broad. Expands about 40 mm. .... **mercedita** Davis

Head including eyes about 4 mm. broad. Expands about 35 mm. .... **minuta** Davis

**HH.** Both pairs of wings clouded, particularly the basal half of front pair.

Head including eyes about 4.5 mm. broad, membranes

at base of both pairs of wings vermilion; tergum black. Expands about 34 mm.

**Tibicinoides cupreo-sparsus** (Uhler)

In addition to the species mentioned in the key there are two others of which only the female sex is known. *Okanagana hirsuta* Davis was described and figured in the JOURNAL OF THE N. Y. ENTOMOLOGICAL SOCIETY for March, 1915, from a specimen in the collection of the American Museum of Natural History, labeled Santa Rosa Island, California. It expands about 80 mm., and resembles a greatly enlarged *vanduzeei*, but it is even more hairy beneath than in that species; the front of the head is not quite as rounded, and the basal cell of the fore wing is clear instead of clouded as in *vanduzeei*. Unfortunately in the original description the width of the fore wing in *hirsuta* is printed 7 instead of 11 mm. The insect is shown correctly in the figure.

*Okanagana rotundifrons* Davis was described and figured in the JOURNAL OF THE N. Y. ENTOMOLOGICAL SOCIETY for September, 1916, from a female in the collection of the University of Kansas taken in Arizona. It expands 71 mm., and is a shining black and yellowish species, with a conspicuously blunt and rounded front.

**Okanagana cruentifera** (Uhler). Pl. xix, fig. 2.

1892. Trans. Md. Acad. Sci., i, p. 161.

In the United States National Museum there is a female from "F. H. Hillman, Reno, Nev. 6, 21, 1890," labeled "*Tibicen cruentifera* Uhler, Cotype from Uhler's Coll." in the handwriting of Mr. Heide-mann. No label by Uhler is on the specimen. It is spread; expands 75 mm., with the front of the head quite prominent, and the notch in the last ventral segment double. According to the original description all of the cotypes came from Nevada. Another specimen in the Uhler collection, captured after *cruentifera* had been described, is labeled "F. H. Hillman, Reno, Nev. 7, 3, 98," and identified as "*Tibicen cruentifera* Uhler, Nev." in Uhler's handwriting. This is a spread specimen, expands 78 mm.; front is prominent; the pronotum is almost entirely black, with a hair line of red along the hind margin; venation about the marginal cells not clouded.

A male in the U. S. National Museum is labeled simply "Nev.," and on a separate label "P. R. Uhler collection." This may be one

of the cotypes. It expands nearly 70 mm.; head and pronotum entirely black, grooves containing much pubescence; mesonotum with the usual discal reddish spots, hind margin red; tergum with posterior margins of the segments red; fore wings with the costal margin orange to the end of the radial cell, darker beyond; first and second cross veins not infuscated; basal cell clouded; mebranes at base of both pairs of wings of a bright red. Beneath femora dull red variegated with black especially at the ends; under side of abdomen black with the posterior margin of each segment rather broadly and unevenly margined with red; valve light colored. We present a figure of this specimen.

In the American Museum of Natural History there are three females from Nevada, one of them labeled Virginia City, like the one described above. They expand from 70 to 75 mm.

Lately we have received a female collected June 25, 1919, and a male collected June 27, 1919, at Coal Creek, Iron Co., Utah, by Mr. Tom Spalding.

Four males labeled Los Angeles Co., Cal., July, Collection Coquillett, are in the United States National Museum and are like the Nevada male described above. Two males from Nellie, Calif., June 20 and 24, 1918 (E. P. Hewlett), are in the writer's collection and are darker than the other specimens here mentioned, with the costal margin of the fore wings not as brightly colored and edged with a narrow line of black. The membranes of both pairs of wings are blood red at base as in true *cruentifera*. The tergum is nearly all black, while beneath the abdomen and valve are shining red, the former blackened along the sides and at base. Expand 70 mm. This seems to be a variety of *cruentifera*.

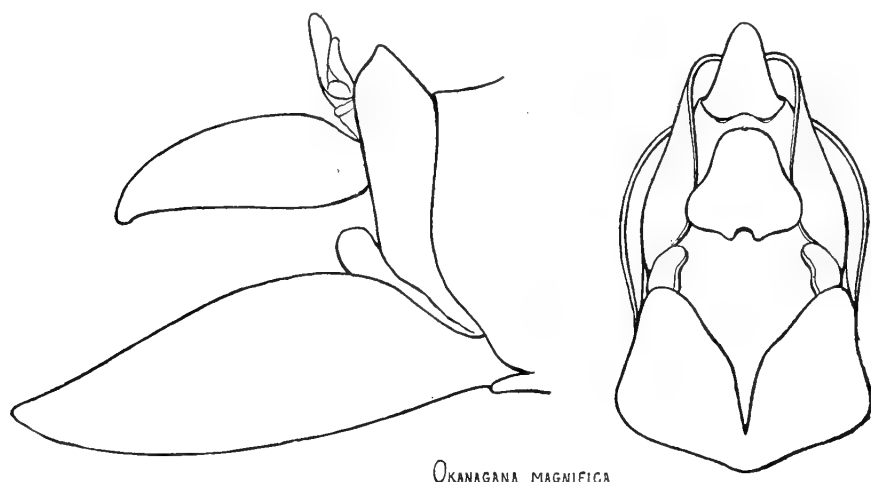
**Okanagana magnifica** new species. Pl. xix, fig. 1.

Type male from Jemez Springs, New Mexico, June 4, 1918 (John Woodgate), and allotype female from same place, July 1, 1918. Davis collection.

Resembles *O. cruentifera*, but is larger and has differently shaped uncus.

Head slightly narrower than the front margin of the pronotum; front moderately protruding and covered with long grayish hair, face also very hairy. Median sulcus of the front well defined. Pronotum with the humeral

angles rounded, the anterior angles not very prominent and almost hidden by long hairs from behind the eyes and growing on the pronotum itself. Last ventral segment slightly constricted at the sides, then broadened out to the extremity, which has the outer angles rounded; not sinuate at extremity. Uncus when viewed in profile elevated centrally with a slight sinuation near



OKANAGANA MAGNIFICA

the lower extremity; when viewed from behind, notched at the extremity, and more deeply so than in *cruentifera*. The valve in the male is long and orange in color. The last ventral segment in the allotype is simply and broadly notched; the notch is double in *cruentifera*. Fore wings with the costal margin bright orange nearly to the extremity of the wings, the remaining veins fuscous, somewhat thickened and clouded at the marginal cells; basal cell blackened; membranes at base of both pairs of wings of the brightest orange; not blood-red as in *cruentifera*. Head entirely black; in some of the paratypes the antennæ are marked with orange on the basal joint. Pronotum entirely black in the type; in the allotype it is very narrowly edged posteriorly with red. Mesonotum red at the sides, otherwise black including the X. Metanotum edged posteriorly with red. Tergum black with the first six segments edged with red at extreme lower part of the sides only, segments seven to nine edged completely on the posterior margin with red. Beneath the body including the legs hairy; the legs are orange-red striped with black and the abdominal segments more evenly edged posteriorly with orange-red than in *cruentifera*.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	35	31
Width of head across eyes .....	9	9
Expanse of fore wings .....	84	84
Length of valve .....	8	

In addition to the type and allotype I have received sixty-two males and eighty-nine females collected at Jemez Springs, New Mexico by John Woodgate at 6,400 ft. to 7,500 ft. elevation, June 2 to July 2, 1918. They were most common about the middle of June. Mr. Woodgate writes that the "Navajo children tear the legs and wings off of the cicadas and eat them—say they taste like pecan nuts."

The species must have been quite plentiful in 1918 in parts of New Mexico, for Mr. Warren Knaus sent me a male and female collected about four miles southeast of Santa Fe, on the old Santa Fe trail on scrub pine and cedar, June 15, at an altitude of about 7,000 feet. In 1919 Mr. Woodgate collected seventy-eight specimens of this species at Jemez Springs. Mohave Co., Arizona, 1919, 3 males, 4 females.

In the United States Natural Museum there is a male *magnifica* labeled "*Tibicen cruentifera* Uhler var. Uhler," from "E. A. Bush, San Jose, Cal., Aug. 2, 1887." Evidently Uhler himself considered this not a true *cruentifera*. Two other specimens are as follows: a female from "Nordhoff, Cal., 4, 6, 1905, W. M. Slosson," expands 88 mm., last ventral segment with notch simple; male "From W. M. Slosson, Nordhoff, Cal., June 4, 1905, found on pinon trees near the west end of San Emedio Mts., Cal." The male bears a further label by Mr. Heidemann, "*Tibicen cruentifera* Uhler var." Also in the U. S. National Museum there is a female from "Nucla, Col. Ch. T. Trueb, Sept. 7, '09," with a slightly smaller head than the Nordhoff female. It expands 88 mm. and the last ventral segment is simply notched. It is labeled "*Fidicina cruentifera* Uhler, O. H."

**Okanagana mariposa** Davis.

1915. Journal N. Y. Ento. Soc., xxiii, p. 12, pl. 3, fig. 2.

The type of this species came from Mariposa Co., California, June 16, 1914. In the collection of the United States National Museum there is a male also from Mariposa Co., Calif. It has been compared with the type and is like it in every particular, except that it is larger, expanding 90 mm. Lately Dr. F. E. Blaisdell has sent to me two males and a female collected by him at Hullville, Lake Co., Calif., June 13, 1917. The female is the first one I have seen and is colored, as are the two males, almost exactly as in the male type. The size is very nearly the same. Beneath the notch in the last ventral segment is remarkable for its great breadth; at its central portion there

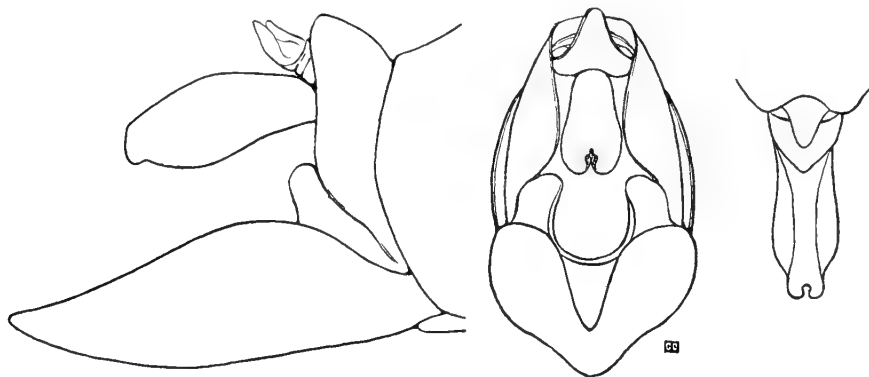
is a minute sinuation just opposite the ovipositor. The straight outer margin of the fore wings and the broad head with slightly protruding front, are conspicuous features of this large species.

A male and female collected at Bellevue, Washington Co., Utah, June 21, 1919 (Tom Spalding) are like the specimens examined from California.

**Okanagana vandykei** Van Duzee.

1915. Journal N. Y. Ento. Soc., xxiii, p. 38.

Reported in the original description from Carrville, Trinity Co., Calif., June 29, 1913; Nash Mine, Trinity Co., Calif., June 29, 1913, 8,000 ft., and Plumas Co. Calif., June. To these records may be added a female from Keddie, Plumas Co., Calif., June 7, 1918, 3,500 ft. (F. M. Jones), Davis collection. We have examined a male from



OKANAGANA VANDYKEI

Riddle, Oregon, June 18, which is like the paratype from Plumas Co., with the same long, orange colored valve, orange marks on pronotum, etc., except that the front is more prominent and black. A female from Forest Grove, Oregon, July 30, 1917 (Catherine Jones collector), has the body colored as usual, but the costal margin of the fore wings to the end of the radial cell is bright green instead of the more usual orange. The first anal vein is also bright green, and the basal cell is darkened along the hind margin.

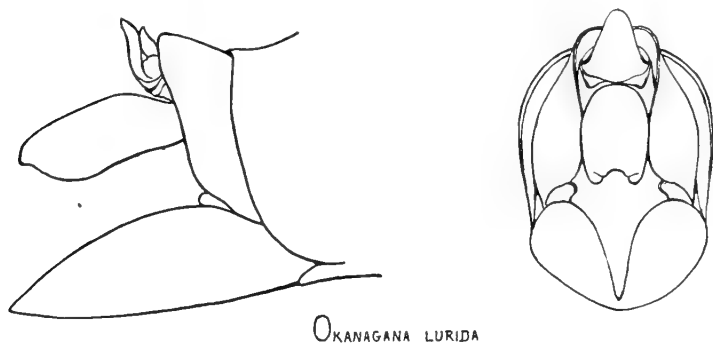
**Okanagana lurida** new species. Pl. xix, fig. 3.

Type male from Pulman, Washington (C. V. Piper). Collection U. S. National Museum.



Resembles *Okanagana vandykei* in color but has less dark markings, and is more shining. The uncus is not as deeply cleft at extremity as in that species. It is probably generally smaller, judging from the type.

Head slightly narrower than the front margin of the pronotum;



front moderately produced. Median sulcus of the front not very deep. Pronotum with the humeral angles rounded, the lateral edges rather rough and uneven, and the anterior angles prominent. Last ventral segment hardly constricted at the sides, but evenly narrowed to the extremity, which is almost truncate. Uncus when viewed in profile sinuate on lower part with the greatest depth beyond the center; when viewed from behind shallowly notched. Fore wings with the venation almost entirely straw colored; the veins about the marginal cells are fuscous, and the basal cell is clear or nearly so. The membranes at the base of both pairs of wings are bright orange. Head reddish straw-colored with a short irregular blackish mark each side of the central ocellus, and a blackish dot between each hind ocellus and the eye. Front and the transverse rugæ black. Pronotum reddish straw-colored with a central band, narrowest in the middle, black; also blackened irregularly in the grooves, and a submarginal black band posteriorly and on the sides. Mesonotum almost entirely reddish straw-colored; the region covered by the W mark blackened; and an irregular central black band extending from thence to the elevated X, which is pale, but the adjoining depressions are black. Metanotum reddish straw-colored, with a submarginal blackened area. Tergum black, with each segment reddish straw-colored posteriorly.

The uncus is black. Beneath the legs are almost entirely light in color blackened at the knees, the abdominal segments are covered with much short hair; are reddish straw-colored margined anteriorly with red. In addition each segment has two dark colored basal blotches more or less connected, one each side of the center. The valve is dark colored on the lower surface, lighter near the upper margins, and when viewed in profile it does not extend as far beyond the end of the uncus as it does in *vandykei* and *ornata*.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.
Length of body .....	26
Width of head across eyes .....	7.5
Expanse of fore wings .....	62
Length of valve .....	5

#### **Okanagana ornata** Van Duzee.

1915. Journal, N. Y. Ento. Soc., xxiii, p. 33.

In the collection of the American Museum of Natural History there is a male labeled "Nevada." We have also examined a male from Hood River, Oregon, June 10, 1916, in the collection of the Oregon Agricultural College, and a female from Blue Canyon, Calif., June 7, 1909 (Ball), in the collection of Dr. E. D. Ball. In the writer's collection there are two males and one female from Sonoma Co., Calif., one of the former being the allotype of the species, and a male from Keddie, Plumas Co., Calif., June 28, 1918, 3,500 ft., collected by Mr. Frank M. Jones of Wilmington, Delaware, who kindly presented it to me. This is a very bright and contrastingly colored species. Mr. Van Duzee states "This species may be recognized by its black, almost immaculate upper surface with bright orange venation."

#### **Okanagana napa** new species. Pl. xix, fig. 4.

Type male from Napa County, Calif. (J. J. Rivers). Collection U. S. National Museum.

Resembles *Okanagana ornata* in size and in being shiny, but is lighter colored, has a larger head and a shorter uncus.

Head quite broad and nearly of the same width as the front margin of the pronotum; front not prominent; median sulcus well defined. Pronotum

with both the humeral and anterior angles rounded, the latter much more so than in either *lurida* or *ornata*. Last ventral segment gradually narrowed to the extremity which is sinuated with the angles much rounded. Uncus when viewed in profile short with the lower side much straighter than in *lurida*; when viewed from behind, shallowly notched. Fore wings with the venation almost entirely straw colored, slightly darkened about the marginal cells; the basal cell is clear. The membranes at the base of both pairs of wings are



orange, but these as well as the venation, lack the bright color of *ornata*. Head black with the grooves, front and the region of the transverse rugæ almost wholly dull orange. There is a broken black band consisting of four spots extending across the front, and the hollows between the transverse ridges are narrowly lined with fuscous. The terminal part of the rostrum is black, the base is pale. Pronotum black centrally, but margined all round except at the anterior angles with dull orange, and the orange of the grooves considerably spread. This leaves only the central part black, with some irregular black marks on the ridges between the grooves, and a submarginal black band along the sides and posterior margin. Mesonotum dull orange with four obconical black marks on the anterior margin, and a central spear-shaped mark extending toward the orange elevated  $\times$ . There is a black dot each side at the anterior extremities of the  $\times$ , also an interrupted black band extending each side from the  $\times$  to the base of the fore wing. Metanotum edged posteriorly with orange. Tergum shining black, with the segments narrowly edged posteriorly with orange. The uncus is black. Beneath the legs are light colored except at the knees and the fore femora are somewhat blackened on the inner side; the abdomen is light, except the usual dark spot centrally near the base, and the valve is also light in color.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.
Length of body .....	24
Width of head across eyes .....	7.5
Expanse of fore wings .....	58
Length of valve .....	4.5

**Okanagana schaefferi** Davis.

1915. Journal N. Y. Ento. Soc., xxiii, p. 19, pl. 3, fig. 4.

This species was described from a single male in the collection of the Museum of the Brooklyn Institute of Arts and Sciences, from Iron Co., Utah, 1904. In June, 1917, Mr. George P. Engelhardt of the Brooklyn Museum collected a number of specimens in the foot hills of the Kolob Mts., Washington Co., Utah, and kindly gave me seventeen males and two females. Other specimens examined have been a male, Manti, Sumpete Co., Utah, June 23, 1903, collection Dr. E. D. Ball, a male from Salida, Colorado, June, 1885, collection University of Nebraska, and a female from Jemez Springs, 6,400 ft., New Mexico, June 17, 1919 (J. Woodgate). A noticeable feature of this large insect is the strongly protruding front of the head.

**Okanagana occidentalis** (Walker).

1866. Walker in Lord's Naturalist in Vancouver Island and British Columbia, ii, p. 339.

This species was listed as a synonym of *rimosa* Say by Distant in his Synonymic Catalogue of Homoptera (1906), but it is distinct from that species, and from *Okanagana bella* described in this paper, which it more closely resembles. The most noticeable differences between these three species have been mentioned in the table, and in series *occidentalis* is not as blue-black as *bella*, and the pubescence on the upper surface is more abundant and more golden in color. The true *rimosa* is a duller colored insect, the tergum not shining as in *occidentalis* and *bella*. Walker's description is poor and we may be in error in applying it to this species. The description would also apply to some specimens of *vanduzeei* except that they are usually too small. He states that the body is, 12 lines in length, is black, and that the mesothorax has two V-shaped testaceous marks, "which extend from the fore border to the disk, and are distinct except at the tips." These V-shaped marks are commonly present in what we have called *occidentalis*, and the tips are usually well defined. In *bella* the V-shaped marks are obscure or absent.

John Keast Lord in The Naturalist in Vancouver Island and British Columbia, has this to say of this species: "But there was one sound—song perhaps, I may venture to call it—that was clearer, shriller and more singularly tuneful than any other. It never ap-

peared to cease, and it came from everywhere—from the tops of the trees, from the trembling leaves of the cottonwood, from the stunted underbrush, from the flowers, the rocks and boulders . . . all chanting the same refrain. . . . It turned out to be an entirely new species, and now figures in the British Museum as *Cicada occidentalis*." Dr. Charles J. Gahan has written me under date of May 12, 1919, that this specimen cannot at the moment be located in the British Museum. It would appear from Lord's original narrative that the type locality for this species is in the north-eastern part of the present state of Washington in Colville Valley, where the Boundary Line Commission had its headquarters.

In the collection of the United States National Museum there is a female *occidentalis* from Victoria, Vancouver, H. G. Hubbard collector, which expands 70 mm. and is like many examples in the writer's collection; the last ventral segment is doubly notched and the basal cell in the fore wing is clear. From the collection of the University of Nebraska we have examined four males labeled British Columbia (G. W. Taylor). From the collection of the Dept. of Agri. Prov. of Nova Scotia, a male collected by W. Downes at Armstrong, B. C., July 12, 1915; and from the collection of H. H. Lyman, a female from North Bend, B. C., July 24, 1890. Prof. A. L. Lovett of the Oregon Agricultural College, has kindly sent the following material from the collection of that institution: Eureka, Wash., June 30, 1895, female; Rainier, Or., July, 1905, male (Thayer); Sauvier's Island, Or., June 8, 1906, male (Farrell); Dixie, Wash. Co., Or., July 31, 1907, male; Oswego, Or., June 5, 1904, female (Ewing), June 8, 1907, female (George Ewing), July 7, 1907, female (George Ewing); Willamina, Or., July 2, 1911, female; Philomath, Or., Aug. 14, 1906, female (Schrack); Corvallis, Or., June 2, 1906, male (Buchanan), June 12, male, July 10, 1896, male, Sept. 2, 1911, female, Sept. 9, 1906, male (Woods); Cascadia, Linn Co., Or., male, July 28, 1903 (Rosendorf), Aug. 1, 1903, male (Rosendorf). Two females from Dilley, Oregon, are in the writer's collection.

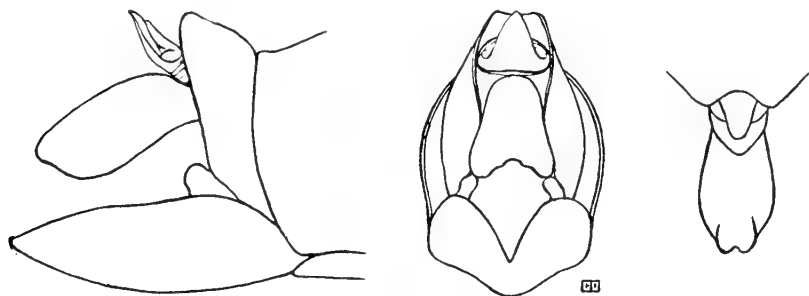
Mr. Otto Huellemann of Wallace, Idaho, has sent me 51 specimens of this species collected near his home, in the years 1915 to 1918 inclusive. Three were collected in May, eight in June, and forty in July. Judging from those received they were very plentiful in

July, 1917. The specimens of this long series are uniform in appearance, they are black above with the hind margin of the pronotum orange; four orange spots arranged in a semi-circle before the mesonotal  $\times$ , and the  $\times$  itself with the elevated parts touched with orange. The basal cell of the fore wing is clear. The last ventral segment in the females is doubly notched.

*Okanagana bella* new species. Pl. xx, fig. 1.

Type male from Stockton, Utah, June, 1915, and allotype female from Soldiers' Canyon, Stockton, Utah, June 27, 1915 (Tom Spalding). Davis collection.

Resembles *Okanagana occidentalis*, but differs as indicated in the remarks on that species, and in the characters given in the table.



OKANAGANA BELLA.

Head rather small and not quite as broad as the front margin of the pronotum; front moderately produced; median sulcus well defined. Pronotum with the humeral angles rounded; the anterior angles prominent and slightly rounded. Sides of pronotum have a few irregular serrations. Last ventral segment longer than in *occidentalis*, and with the sides curved inward to the extremity which is rounded. In some specimens from southern Utah the extremity of the segment is slightly sinuate. Uncus when viewed in profile not hooked at extremity, short and slightly deeper beyond the middle; when viewed from behind, with a shallow notch at extremity. Last ventral segment of the allotype has a broad simple notch, but in some of the paratypes there is a slight indication of a second notch. Fore wings with the costa orange to the end of the radial cell, darker beyond; the subcostal vein is fuscous. Basal cell clouded; the remaining veins fuscous, except at the base of wing, which is orange; the membranes of both the fore and hind wings are vermilion. Head black with the supra-antennal plates and the grooves in front of the middle ocellus orange. The region of the transverse rugæ black bordered by orange. The rostrum is black, orange at base. Pro-

notum shining black, slightly bluish, with the sides and posterior margin orange; the front margin sometimes narrowly edged with orange. Mesonotum shining bluish black bordered on the sides posteriorly with orange. The elevated X has the fore limbs touched with orange, in front of which are the usual four orange spots arranged in a semi-circle. In some of the darker specimens from Oregon the mesonotum is more nearly black. Metanotum black edged posteriorly with orange. Tergum shining black, with the same slightly bluish tint of the parts already described; the segments very narrowly edged posteriorly with orange, the orange most conspicuous at the sides. In some of the Oregon specimens the tergum is nearly all black. Uncus black. Beneath, the legs are orange blackened at the joints and considerably blackened on the inner side of the fore femora. The abdominal segments are blackened centrally, orange on the posterior margins, also with a black spot on each segment at the sides. Valve black, sometimes orange at the sides along the upper margin. In some of the specimens from Colorado the valve is entirely orange.

## MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	25	23
Width of head across eyes .....	6.5	7
Expanse of fore wings .....	58	62
Length of valve .....	5	

Some of the paratypes represent a darker race, blacker on the legs, and in the fore wings the costal margin is not as conspicuously orange.

This insect has generally been considered the *Cicada rimosa* of Say, but that species is duller colored and appears to be more eastern in its range.

The following specimens of *Okanagana bella* have been examined:

Utah.—Logan, June 10, 1904, male; July 4, 1904, two females; June 22, 1906, four males, two females; Logan Canyon, June 19, 1909, three males and two females; July 4, 1909, two females, from collection Dr. E. D. Ball. Garland, June 11, 1904, male; June 18, 1904, male and two females, collection Dr. Ball. Wellsville, July 3, 1904, female, collection Dr. Ball. Salt Lake City, June 8, 1902, male, and June 15, 1902, male, Davis collection; male and two females without date labels (Dr. Henry Skinner), collection Acad. Nat. Sci., Philadelphia. Silver Lake, July (Dr. Skinner), collection Acad. Nat. Sci., Philadelphia. Mill Creek, June 20, 1906, two females (E. G. Titus),

Dr. Ball collection. Stockton, June, 1915, three males (Tom Spalding), and Soldiers' Canyon, Stockton, June 27, 1915, three males and two females (Tom Spalding), Davis collection. Santaquin, male and two females (T. H. Parks), Davis collection. Provo, June 3, 1910, female; June 4, 1910, two males; June 24, 1912, two males and two females (Spalding), Davis collection. Eureka, June 19, 1910, female (Spalding), Davis collection. Nephi, June 25, 1912, male, collection Dr. Ball. Cedar Mountains, Iron Co., 8,500 ft., July 11, 1917, seven males (Geo. P. Engelhardt), Davis collection. Kolob Mountains, Washington Co., 8,500 ft., June 30, 1917, eight males (Geo. P. Engelhardt), Davis collection.

Kansas.—Male and female with no date label, collection Acad. Nat. Sciences, Philadelphia.

Colorado.—Livermore, July 8, 1900, two males, collection Dr. Ball. Ft. Collins, June 29, 1901, two males and three females, collection Dr. Ball. Estes Park, male, collection Univ. of Kansas. Golden, June 26, 1911, male (C. A. Frost), Davis collection. Russell, June 24, male (H. S. Smith), Davis collection. Creede, 8,844 ft., Aug., 1914, female (S. J. Hunter), collection Univ. of Kansas. Durango, August 1, 1912, male (Oslar), Davis collection.

New Mexico.—Hot Springs, San Miguel Co., 7,000 ft., August, 1882, female (F. H. Snow), collection Univ. of Kansas. Jemez Springs, June, 1916, two females; July 5, 1916, female; June 14, 1917, female; June 20, 1918, two females; June 15, 1919, female (John Woodgate), Davis collection. Albuquerque, August 14, 1910, female (Oslar), Davis collection.

Wyoming.—Newcastle, male and female, collection Univ. of Nebraska. Yellowstone National Park, June 20, 1907, male; June 30, 1907, female; July 9, 1907, female (Col. Wirt Robinson), Davis collection.

Montana.—Nigger Hill, Powell Co., July, female (W. M. Mann), Davis collection. Sedan, July 1, 1906, four males. Corvallis, July 14, 1908, male. Gallatin Co., June 16, 1902, male (R. A. Cooley), and July 1, 1915, male. Bozeman, 4,800 ft., July, 1901, male and female (E. J. S. Moore); July 3, 1905, male; July 3, 1906, male; July 20, 1907, female; June 20, 1912, three males. Paradise Valley, Park Co., July 9, 1904, male and female. Billings, July 10, 1912, female. Cul-



bertson, Valley Co., June 29, 1911, female (J. R. Parker). Enid, July 12, 1912, male. Miles City, Aug. 4, 1915, male. All of the Montana records, the first one excepted, are from specimens in the collection of the Montana Agricultural Experiment Station.

Idaho.—Whitebird, June 29, 1907, male (Dr. J. M. Aldrich). Moscow, June 13, 1911 (Dr. J. M. Aldrich). Both of these records are from specimens in the collection of the University of Idaho.

California.—El Dorado Co., July, 6,280 ft., male (Dr. F. E. Blaisdell). Monachee Meadows, Tulare Co., 8,000 ft., July 17, 1917, male (G. R. Pilate). Top of Mt. San Antonio, 10,000 ft., Southern Calif., June 29, 1914, female (H. Newcomb). San Antonio Canyon, Ontario, July 25, 1907, male and female, Coll. Ohio State Univ. In these and some of the Oregon examples the basal cell of the fore wings is almost entirely black.

Oregon.—Corvallis, July 18, 1896, male and female without date. Salem, June 30, 1911, female. Crooked River, central Oregon, June 23, 1906, five males, three females. Minam Nat. Forest, July 5, 1914, female (W. J. Chamberlin). Baker City, July 6, 1906, male, and July 12, male. The above Oregon records from specimens in the collection of the Oregon Agricultural College. The following two from the collection of the U. S. Biological Survey: McDermitt, Malheur Co., June 5, 1915, male (E. A. Preble); Rome, Owyhee River, female without date label (E. A. Preble).

Lately Mr. L. P. Rockwood sent me for examination five males and one female collected at Baker City, June 17, 18 and 24, 1917, which have very dark colored bodies, the tergum showing but little red on the edges of the segments at the sides, the basal cell is nearly black; the anal membranes are vermilion and the costal margin of the fore wings is bright orange to the end of the radial cell. He also sent to me two males and a female collected by C. W. Creel, at Paisley, Lake Co., south central Oregon, on the borders of Chewaucan Marsh.

Washington.—Ephrata, Douglas Co., June 21, 1918, female (A. C. Burrill), collection U. S. Entomological Station, Forest Grove, Oregon.

Alberta.—Jasper, July 4, 1915, two males, collection Cornell University and Davis collection.

British Columbia.—Male without any date labeled "Brit. Col. (G. W. Taylor)," Davis collection. Eillooet, July 6, 1918, male (A. B. Baird), Baird collection.

**Okanagana rimosa** (Say). Pl. xx, fig. 2.

1830. *Cicada rimosa* Say, Jl. Acad. Nat. Sci., Phila., vi, p. 235.

1854. *Cicada noveboracensis* Emmons, Nat. Hist. N. Y. Ins., p. 152, pl. 9, fig. 6.

The principal characters given in the original description are: "Body black above, . . . a rufus spot over the antennæ; thorax obsoletely varied each side with piceus; posterior and lateral edges rufus: scutel with the elevated cruciform line, two spots before it, and two or three on each side rufus: . . . tergum, posterior edges of the segments rufus: beneath rufus, varied with black: . . . length to the tip of the hemelytra one inch and one-fourth." Say further adds: "Mr. Nuttall presented me two specimens, which he obtained on the Missouri, and I found one on the Arkansaw"; also: "On the prominent middle of the hypostoma is a very obvious impressed line."

The insect which he collected "on the Arkansaw," when he was with Major Long's expedition to the Rocky Mountains in 1819-1820, may not have been the same species as the two specimens mentioned first in the description and given to him by Nuttall, who obtained them along the Missouri River.

It next becomes important to ascertain, if possible, from what locality the type specimens of *Cicada rimosa* were obtained, and I have been to some pains to look up the original authorities. As an aid to this Dr. N. L. Britton, of the New York Botanical Garden, has sent to me some notes by Dr. P. A. Rydberg on the three journeys made by Thomas Nuttall, the botanist, to regions west of the Mississippi. It was on the first of these, namely in 1811, or Astoria expedition, that he collected the two specimens referred to, for the very good reason that in the second expedition of 1819-1820, he went along the Arkansas River, and did not touch the Missouri; and the third expedition started in 1834 after *Cicada rimosa* had been described.

John Bradbury, another botanist, was with the Astoria expedition, and in 1817 he published in London, England, a narrative of his travels in the interior of America. He and Nuttall accompanied Mr. Hunt from St. Louis up the Missouri as far as the Arickara Indian

village in the north central part of the present South Dakota, and in late June they both went about 150 miles still further north to the Mandan Indian village close to the site of the present city of Bismark in North Dakota, where they stayed for a few days before returning to the Arickara village. In Bradbury's account we read on page 226 the following from Mr. Cook's narrative of Mr. Hunt's expedition from the Aricaras to the Pacific. "Messrs. Hunt, Crooks, Miller, M'Clellan, M'Kenzie, and about sixty men, who left St. Louis in the beginning of March, 1811, for the Pacific Ocean, reached the Aricara village on the thirteenth day of June. . . ." Mr. Crooks was one of the partners and we quote his statement to show, among other things, that it was 1811 and not in 1810, as has sometimes been stated, that the Astoria party ascended the Missouri. From reading Irving's account one might easily get the impression that it was in 1810.

Irving in his Astoria says: "On the 18 of July Mr. Hunt took up his line of march by land from the Arickara village leaving Mr. Lisa and Mr. Nuttall there where they intended to await the expected arrival of Mr. Henry from the Rocky Mountains. As to Messrs. Bradbury and Breckenridge they had departed some days previously on a voyage down the river to St. Louis, with a detachment from Mr. Lisa's party."

Mr. Bradbury records that he started on July 17, and it took him until the end of July, or slightly longer, to reach St. Louis, and on page 193 he further states that Mr. Lisa with whom Nuttall had remained, arrived in St. Louis in November.

From the foregoing it will be seen that *Cicada rimosa* was no doubt taken close to the Missouri River in what is now North or South Dakota, for Mr. Nuttall did not arrive at the Aricara village until about the time the species of *Okanagana* emerge, and allowing him a month or more to reach St. Louis, he left the Indian village after their season was over.

We now know that there are several species of *Okanagana* that resemble *rimosa* and may be mistaken for it, but having located Mr. Nuttall's whereabouts in June, July, August and September, 1811, covering the time of emergence of these insects, we can more certainly identify the species by our examination of specimens from the same region. This has been done and a male collected at Sioux City

on the Missouri by A. W. Lindsey, and presented to me by Prof. H. F. Wickham, has been identified as *Okanagana rimosa*. This insect fits Say's description in every particular. The uncus is slightly more pinched or ridged on the dorsum, also the cleft at the extremity is somewhat deeper than in the males of *Okanagana noveboracensis* (Emmons) from New York and Maine, but in other particulars it appears to be the same. It is probable therefore that *noveboracensis* is the same as *rimosa*, certainly not more than a variety.

The fore wings in *rimosa* and *canadensis* (Provancher) are proportionately narrower than in any of the other species considered and in this particular the two *Okanaganas* that extend to the northeastern United States and eastern Canada, can thus be separated from the more western forms, *tristis* Van Duzee, excepted.

In addition to the Sioux City example already referred to, the following specimens have been examined:

Minnesota.—Itasca, July, 1908, female, and male and female labeled simply "Minnesota," collection University of Minnesota.

Wisconsin.—Bayfield, female (Prof. H. F. Wickham), Davis collection.

Manitoba.—Aweme, June 19, 1917, two males (N. Criddle), Davis collection. Treesbank, July 7, 1907, male, and June 11, 1914, male (N. Criddle), Davis collection.

Ontario.—Toronto, June 19, 1896, female, collection Dr. E. D. Ball.

Illinois.—Ogle Co., male (Uhler collection), U. S. Nat. Museum.

Quebec.—Kazubazua, Ottawa District, July, 1917, male, collection C. B. Gooderham.

Pennsylvania.—Cresco, Monroe Co., June 9, 1918, female (J. N. Knull), Davis collection. Echo Lake, Pike Co., July 8, 1910 (E. Shoemaker), Davis collection.

New York.—Ithaca, July 25, 1916, female, and August 1, 1916, male, collection Cornell University. Windsor, Broome Co., June 5, 1918, female, and June 7, 1918, female (Notman), Howard Notman collection. Wilmington, Essex Co., July 12, 1914, male (Davis), Davis collection. Rockaway Beach, Long Island in wash-up, June 26, 1909, female (Geo. P. Engelhardt), collection Museum Brooklyn Institute Arts and Sciences, and June 14, 1914, female (Ernest Shoemaker), Davis collection.

Massachusetts.—North Saugas, July 8, 1907, male (D. H. Clements), U. S. Nat. Museum. Melrose Highlands, June 4, 1911, two males (H. E. Smith), U. S. National Museum. Medford, male (J. H. Rogers), Boston Soc. Natural History. Lawrence, male (J. O. Treat), Boston Soc. Natural History. Concord, June 25, 1854, male, Harris collection, and June 17, 1914, male (W. Reiff), Boston Soc. Natural History.

New Hampshire.—Chocorua, August 12, 1917 (Linder), Boston Soc. Natural History.

Maine.—Cumberland Co., July 11, 1916, male and female, and July 12, 1916, two males (A. S. Nicolay), Davis collection. Brunswick, male (A. S. Packard), Boston Society Natural History. Hampden, July 10, 1907, two males (C. W. Johnson), Davis collection. Orono, July 13, 1906, male, July 31, 1906, male, and July 18, 1913, female, collection Me. Agri. Exp. Station. Harrington, June, 1908, Boston Soc. Natural History. Columbia, July 8, 1912, two males, three females (S. F. Blake), Davis collection; July 3, 1912, male and female, and July 8, 1912, male and three females (S. F. Blake), Boston Soc. Natural History.

Nova Scotia.—Truro, July 5, 1913, male (L. G. Saunders), Saunders collection.

The song of this species continues for some time and somewhat resembles the sound produced by *Neoconocephalus retusus* or *N. robustus*, two of the large, long-horned katydid-like insects. Though we have not been able to collect them, we have heard cicadas of the genus *Okanagana* singing on Crow's Nest Mt., West Point, N. Y., on June 15, 1913, and again on June 13, 1914, and Col. Wirt Robinson collected a pupa-skin on the same mountain. We have also heard them singing in Letchworth Park, Portage, N. Y., June 13, 1915; near Potter's Swamp, Yates Co., N. Y., June 14, 1915, and in Eggleston's Glen on the east side of Lake Keuka, N. Y., June 15, 1915.

***Okanagana canadensis*** (Provancher). Pl. xx, fig. 3.

1889. Petite Faune Entomologique du Canada, iii, p. 213.

This name is placed by most authors as a synonym of *rimosa*, but we think incorrectly. *Okanagana canadensis* on the whole is a larger species than *rimosa*; it is also blacker with the upper portions especially the tergum adorned with much tomentum, different from the

vestiture of *rimosa*. While the pronotum is usually black edged posteriorly with testaceous, there are occasional specimens in which it is mottled each side with testaceous.

I am indebted to Prof. L. M. Stöhr of Ironside, Quebec, for a long series of this species. On June 21, 1916, he collected a male; in 1917 he collected in all 39 specimens as follows: June 22, 2 males; June 23, 4 males; June 24, 3 males; June 26, 3 males; June 27, 6 males; June 28, 7 males; July 2, male; July 19, male and female; July 22, female; July 26, 5 males, 1 female; July 28, 2 males; July 30, male, and Aug. 15, female. In 1918 he collected ten specimens as follows: June 14, male; June 15, male; June 19, 3 males; June 20, female; June 25, 2 males; July 30, male; July 31, male. In June, 1919, he collected eighteen males and five females. These insects are alike and very black in appearance with the venation of the front wings somewhat thickened. When the wings are closed they show the narrow testaceous hind border of the pronotum, a spot each side at the base of the fore wings, four spots arranged in a semi-circle in front of the X, and the higher parts of the X itself usually touched with testaceous.

Prof. Stöhr writes as follows concerning this species: "It is almost exclusively on pines; I have heard it, however, on cedar trees, and in two instances on willows. Usually it perches at the very extremity of the trees, often only a few inches below the terminal bud, or at the end of the branches. In order to begin the hunting one moves toward the cluster of trees from whence the song seems to proceed. It is, however, difficult to take one's bearings for the noise now seems to come from the left and now from the right. Conditions still get worse when the suspicious insect suddenly stops its song while one is looking his eyes out in order to locate it, and absolute silence follows the loud clamour. If one has not ascertained with certainty the exact position of the insect, he might better try his luck elsewhere, if he does not want to take too many chances. Once a tree found on which an *Okanagana* sits, the ascent begins. When the song has not stopped before, invariably it ceases then, and from the top of the pine one has no other resource than to inspect branch by branch and with good luck one may thus detect the Cicada perched on a twig, the dark color of the bark making it diffi-

cult to distinguish the insect. After ten minutes or more of silence it flaps its wings spasmodically and accompanies the manœuvre with a low rattling sound; after that the song starts monotonous and strident." The cicadas commence to sing about 9 in the morning and continue until about 5 o'clock in the afternoon or even later. In catching the insects Prof. Stöhr states that he got the best results by enveloping his hand with a net used for taking minnows, the narrow meshes of which would coop up the cicada and prevent it from slipping through the fingers.

In addition to those already mentioned the following specimens of *canadensis* have been examined: Sudbury, Ontario, 1893, female, Davis collection; Hymers, Ontario, June 26, 1913, male, and male without date (H. Dawson), Davis collection; Nipigon, Ontario, July 9, 1907, male and female (Dr. Skinner), Academy Nat. Sci. Philadelphia. Niagara Falls, N. Y., female, Am. Museum Nat. History; Schoharie, Schoharie Co., N. Y., June 14, 1918, male (H. Notman), Notman collection; Enfield Falls, N. Y., August 3, 1901, collection University of Minnesota. Charter Oak, Huntingdon Co., Pa., July 11, 1917, male and female (J. N. Knull), Davis collection. Through the kindness of Prof. F. M. Gaige, we have been able to examine the following from the collection of the University of Michigan: Porcupine Mts., Upper Michigan, Aug. 13, 1904, male (A. G. Ruthven); Isle Royale, Michigan, 1878, three males.

**Okanagana tristis** Van Duzee.

1915. Journal N. Y. Ento. Soc., xxiii, pp. 26, 35.

In the original description based on specimens from Northern California it is stated that, "The elongated form, somber black color and fulvous venter will distinguish this form." It is also quite a large insect. As in *occidentalis* the notch in the last ventral segment of the female is double, but in addition to being differently colored, it is larger than *occidentalis* and has narrower wings.

Specimens have been examined as follows:

California.—Dunsmuir, July 20, three males (Dyar and Caudell), U. S. Nat. Museum; Keddie, Plumas Co., 3,500 ft., June 29, 1918, female and July 7, 1918, female (F. M. Jones), Davis collection; Plumas Co., June 16, 1913, male (Nunenmacher), Davis collection; Eldridge, Sonoma Co., paratype, female, Davis collection; Eldridge,

male, Davis collection; Sonoma Co., female, Davis collection; Trinity Co., June 6, 1917, female (E. R. Leach); Santa Cruz Co., July, 1917, male (E. R. Leach), Davis collection.

Oregon.—Josephine Co., June 8, 1910, female, and June 9, 1910, male (Nunenmacher), Davis collection.

Washington.—Near Mt. Rainier, August 25, 1916, female (J. A. Kuche), Davis collection.

**Okanagana arctostaphylæ** Van Duzee.

1915. Journal N. Y. Ento. Soc., xxiii, pp. 26, 34.

This species was described from four males and one female from Calaveras Co., Calif., 1,800 ft., collected by Dr. F. E. Blaisdell. One of the male cotypes is now in the U. S. National Museum, and one in the writer's collection.

The uncus is not hooked at the extremity and so for convenience in identification the insect is considered here, but it and *rubrovenosa*, which has a hooked uncus, closely resembles each other. They are also both rather slender bodied insects. The color of the basal cell, costal margin, veins and membranes, is dull red in both species. In *arctostaphylæ*, however, the body is not as black as in *rubrovenosa*; it has a black band connecting the eyes; a black irregular spot behind the ocelli; sides of the pronotum blackened; collar of the same reddish color as the central part of pronotum; abdomen with a black dorsal vitta, broadest at the base.

**Okanagana canescens** Van Duzee.

1915. Journal N. Y. Ento. Soc., xxiii, pp. 26, 37.

The male type of this species came from Sonoma Co., Calif., July 14, 1908, and is in the collection of Dr. F. E. Blaisdell. Mr. Van Duzee also had a female from the Bay region of California when he wrote his description.

To these records we can add the following: all from California. A male labeled "California," Am. Museum Natural History; Chico, two males (Dr. E. D. Ball); Alameda, July 12, 1911, male (Nunenmacher), Davis collection; Palo Alto, three males (C. H. Kennedy), Davis collection; Merced Co., two males, June 19, 1914, Davis collection. One of the males from Merced Co., and one from Palo Alto, have been examined by Mr. Van Duzee. In the U. S. National Mu-



seum there is a male from Santa Cruz Mts., Calif., that appears to belong to this species. It bears a label "New to Uhler, 1893." The lighter colors on the head, pronotum and mesonotum are much more extended than usual. The tergum is black; the uncus is the same as in *canescens*.

**Okanagana viridis** Davis.

1918. Journal N. Y. Ento. Soc., xxvi, p. 153, pl. 8, figs. 4-5.

This species was described from a male and female from O'Reilly, Mississippi, and so far they are the only specimens known. Its green color and size will serve at the present time to separate this remarkable insect from the other species of the genus.

**Okanagana aurantiaca** Davis.

1917. Journal N. Y. Ento. Soc., xxv, p. 9, pl. 2, fig. 4.

The three males and one female from which this orange and black species was described are supposed to have come from Lower California, Mexico. No additional specimens have been seen.

**Okanagana fratercula** Davis.

1915. Journal N. Y. Ento. Soc., xxiii, p. 20, pl. 3, fig. 5.

This was described from a single male in the collection of the Museum of the Brooklyn Institute of Arts and Sciences, from Iron Co., Utah. The following are additional records: Kolb Mts., Washington Co., Utah, 8,500 ft., June 30, 1917, male (George P. Engelhardt), Davis collection; Nephi, Utah, June 25, 1912, male (Dr. E. D. Ball), Davis collection; Blackfoot, Idaho, June 22, 1904, male (E. S. G. Titus), U. S. National Museum; Springfield, Idaho, July 24, male and female (H. Skinner), Acad. Natural Sciences, Philadelphia; Reno, Nevada, June 6, 1909, two males (Dr. E. D. Ball), Davis collection; Iron Springs, Cedar City, Iron Co., Utah, June 26, 1919, 5,750 ft., three males and twelve females (T. Spalding); Coal Creek, Iron Co., Utah, June 27, 1919, male (T. Spalding), Davis collection. The specimens from Nevada and Iron Co., Utah, may belong to a distinct and larger species with wing expanse as great as 65 mm. They have the front wings beautifully colored. The veins surrounding the marginal cells and first ulnar cell, are very dark, the remaining veins are bright yellow, and the basal cells is blackened. The tergum is blacker than in typical *fratercula*, segments seven and eight being the only

ones edged with orange on dorsum; valve yellow. The female from Springfield mentioned above is like the male type with which it has been compared, except that it expands 58 mm. instead of 46. The shape of the head and colors are the same. The last ventral segment shows a slight indication of a double notch.

**Okanagana oregona** Davis.

1916. Journal N. Y. Ento. Soc., xxiv, p. 233, pl. 11, fig. 1.

The original description was from the type, allotype, and thirteen other specimen, all from Oregon. Additional records are: Wren, Oregon, July 4, 1905, male; East Toll Gate, Oregon, July 15, 1906, female, and Mayville, Oregon, July 15, male, all from Prof. A. L. Lovett, and in the collection of the Oregon Agri. College. Mt. Moscow, Latah Co., Idaho, 5,000 ft., two males (T. Magee), from Prof. A. C. Burrill, Univ. of Idaho. Bridger Canyon, Gallatin Co., Montana, July 7, 1904, female, from Prof. R. A. Cooley, and in the collection of the Montana Agri. Experiment Station.

The venation in the wings of this small species is yellowish in color, and the wings are proportionately narrower than in the preceding species.

**Okanagana triangulata** Davis.

1915. Journal N. Y. Ento. Soc., xxiii, p. 14, pl. 3, fig. 7.

This species was described from a male collected in Mendocino Co., California, and a female in the collection of the American Museum of Natural History from Angel Island near San Francisco was cited as probably of the same species. Mr. G. R. Pilate has sent to me from Olancha, Inyo Co., California, 88 males and 84 females collected June 25, 1917, that agree with the type. They were very numerous at that time on the grass of the Olancha meadows, and Mr. Pilate states that his fingers became quite sticky from some alkaline substance that adhered to the insects as they crawled from the soil. While this species and *oregona* resemble each other, they may be separated by the characters given in the table, which appear to be constant for the long series examined. Four males have recently been received from Ukiah, Mendocino Co., California, May, 1919 (E. P. Hewlett).

**Okanagana synodica** (Say).

1825. Journal Acad. Nat. Sci. Phil., iv, p. 334.

There is no other described *Okanagana* that closely resembles this narrow bodied, small-headed, yellow and black species, which Say recorded as inhabiting the base of the Rocky Mountains. It has a much greater distribution than has heretofore been given. The following specimens have been examined:

Montana.—Livingston, July 31, 1905, three males; Miles City, July 11, 1915, male, all from collection Montana Agri. Exp. Station.

Nebraska.—Squaw Canyon, Sioux Co., July 20, 1892, three males; War Bonnet Canyon, eight males, ten females; Bad Lands north of Monroe Canyon, Sioux Co., July, on sage, five males (M. A. Carriker, Jr.), and male and female, June 21, 1911 (R. W. Dawson); Big Spring, June 29, 1912, eight males (E. M. Harrison). All Nebraska records from collection University of Nebraska.

Kansas.—Hamilton Co., 3,350 ft., five males (F. H. Snow); Rush Co., 2,060 ft., June 29, 1912 male (F. X. Williams), and Trego Co., 2,450 ft., July 12, 1912, male (F. X. Williams), collection University of Kansas. In the collection of Purdue University there are two females and a male labeled Kansas, and in the Academy Nat. Sciences, Philadelphia, two examples without date.

Colorado.—Denver, May, male; six males and a female without date, and a male labeled "on prairie around Denver, Col., May" (Oslar), Davis collection. Ft. Collins, male (Pergande and S. Henshaw), Mus. of Comparative Zoölogy, Cambridge, Mass. Ft. Collins, June 18, 1900, two males; Pueblo, June 15, 1900, male, and Laramie, June 17, 1900, three females, collection Dr. E. D. Ball. Salida, July 2, 1885, three males and three females, and four males, 1885, collection University of Nebraska.

New Mexico.—Female labeled "New Mex.," Davis collection. Male labeled "New Mex." Museum of Comparative Zoölogy, Cambridge, Mass. Sandia Mts., N. M., male, collection Florida Agri. Exp. Sta.

Texas.—Tascosa, June 1, 1918, male (Miss M. McGill), Davis collection.

**Okanagana balli** new species. Pl. xx, fig. 5.

Type male from Little Rock, Iowa (Dr. E. D. Ball), and allotype female from same locality. Davis collection.

This is a small species a little larger than *synodica*, with the wings not quite as transparent as usual, which is also the case in *synodica*.

Head not quite as broad as the front margin of the pronotum; front rather prominent. Median sulcus of the front well defined. Pronotum with the humeral angles rounded and the anterior angles rather prominent. Last ventral segment with the base about as long as the sides, which gradually converge to the truncate extremity. Uncus when viewed in profile sinuated



but not hooked at the end; when viewed from above evenly curved and narrowed to the extremity which is notched. The last ventral segment in the female allotype is doubly notched. Venation of both pairs of wings yellowish, the costal margin of the fore wings a little darker beyond the radial cell; basal cell yellowish and translucent. The membranes at the base of both pairs of wings are orange-red in color. Dorsum partly clothed with short golden hairs especially on the abdomen along the posterior margin of the segments; beneath the pubescence is short. Head black with all of the grooves and supra-antennal plates testaceous, beneath black in the region of the transverse rugæ, which are margined with testaceous; rostrum pale at base. Pronotum black variegated each side, especially in the grooves with pale, and margined all around, except for a short space at humeral angles with testaceous. Mesonotum black, with the hind margin, the elevated X, two spots at the anterior extremities of the X, and the posterior part of the W-mark, testaceous. Metanotum black, posteriorly margined with testaceous. Tergum black, the segments narrowly edged posteriorly with testaceous. Uncus black with a dorsal pale stripe. Beneath pale, including the valve; the usual black spot at the base of the abdomen; legs pale, femora darkened.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	19.5	20
Width of head across eyes .....	6	6
Expanse of fore wings .....	47	51
Length of valve .....	4	

*Okanagana balli* looks something like a small *rimosa*, but is more yellow in color, and the transverse fold crossing the fore wings at the node is sometimes developed, as it is in *synodica*.

The first specimen I examined of this species came from Dr. O. S. Westcott, Oak Park, Ill., but was without locality or date label. In the U. S. National Museum there is a female labeled Winona, Minn., and in the Uhler collection in the same museum, there is a male from Greene Co., Iowa, labeled "Tibicen n. sp., Stal." In Prof. Albert P. Morse's collection there is a male labeled Little Rock, Iowa, and Dr. E. D. Ball has sent to me fifteen males and one female from Little Rock, Iowa. It is evident that at the time they were collected they appeared as a swarm, but unfortunately they bear no date. In the collection of the University of Minnesota there is a male labeled Rock Co., Minn., June 24, 1910, and four other males without locality labels. In the collection of the South Dakota State College, there are five males and two females labeled Brookings, S. D., and a male and female labeled S. D. These and the specimens mentioned above closely resemble one another in size and markings.

***Okanagana rubrovenosa* Davis.**

1915. Journal N. Y. Ento. Soc., xxiii, p. 11, pl. 3, fig. 1.

The following records are additional to those given in the original description: Sonoma Co., Calif., July 4, male (O. Sack), U. S. Nat. Museum. The label further states, "Its note is continuous (not intermittent) and not loud. It resembles the whirring of a bee in confinement." Hullville, Lake Co., Calif., June 13, 1917, two males, three females (Dr. F. E. Blaisdell). Ukiah, Calif., May, 1919, three males (E. P. Hewlett). Keddie, Plumas Co., Calif., 3,500 ft., June 24, 1918, two males, and June 28, 1918, male and female (Frank M. Jones). In transmitting these specimens and a twig in which a cicada had oviposited, Mr. Jones writes: "The red cicada, of which there are four examples, was locally abundant and in constant song in the manzanita bushes, and the manzanita twig showing egg-deposit almost certainly belongs to this species, though I did not see the female at work."

The female of this beautiful insect has never been described. The one collected by Mr. Jones expands 64 millimeters and is of the same color as the type; the body black above covered with short reddish

hairs, which gives it a rusty appearance. The tergum is black where denuded of hair. Beneath the abdomen is densely clothed with hair, black in color with the hind margin of the segments dark red. The notch in the last ventral segment is double. There are the same patches of silvery hairs at the base of the fore wings as in the type. The three females received from Dr. Blaisdell are like the one just described, except that they are a little smaller.

**Okanagana vanduzeei** Distant.

1914. Ann. Mag. Nat. Hist., ser. 8, xiv, p. 165.

1914. a. var. *consobrina* Distant. Ann. Mag. Nat. Hist., ser. 8, xiv, p. 165.

1914. b. var. *californica* Distant. Ann. Mag. Nat. Hist., ser. 8, xiv, p. 166.

The type locality for *vanduzeei* and what are here considered as two varieties of that species, is San Diego Co., California.

Through the kindness of Prof. Wm. S. Wright I have received 86 males and 9 females of *vanduzeei*; 25 males and 12 females of var. *consobrina* and 2 males of var. *californica* collected at Dulzura, San Diego Co., Calif., from June 12 to 25, 1917. Prof. Wright considered that he had collected in this long series but one species, and describes its song as follows: "It is low, long continued and sweet. They will sing for nearly half an hour without a quaver; they usually are to be found setting high up in the brush, seldom in the trees."

In addition to the specimens already mentioned the following have been examined, and unless otherwise stated they are in the writer's collection.

San Diego, Calif., May 6, 1916, twelve males, two females (Prof. Wm. S. Wright); San Diego, Calif., June 25, 1914, two males determined as *vanduzeei* and collected by Mr. Van Duzee; Santa Catalina Island, June, 1917, male; Santa Rosa Island, male, collection Am. Museum Nat. History; Los Angeles, Calif., June 10, 1916, male (A. C. Davis); San Jose, Calif., July 4, four males (King), collection Dr. E. D. Ball; Alameda Co., Calif., June 29, 1914, nine males, June 30, 1914, thirty-four males and two females (F. W. Nunenmacher); Piedmont, Alameda Co., Calif., July 22, 1912, two males, May 18, 1917, male, and July 2, 1917, eight males (Nunenmacher); Contra Costa Co., Calif., June, male; Keddie, Plumas Co., Calif., 3,500 ft., June 26, 1918, male (F. M. Jones); Oroville, Calif., July 24, 1912, male (E. D. Ball), collection Dr. Ball; Lassen Co., Calif., June 5,

1913, female (Nunenmacher); Twin Falls, Snake River Canyon, Idaho, July 6, 1917, female (Mrs. A. C. Burrill). Mr. Van Duzee has recorded this species as far north as Mt. Rainier, Washington.

Mr. E. R. Leach has sent to me the following specimens of a small form of *vanduzeei* expanding from 50 to 55 millimeters: Trinity Co., Calif., July 18, 1917, two males, one female, and June 17, 1918, two females.

Of variety *consobina* the following have been examined: San Diego Co., Calif., May 22, 1914, three males; May 23, 1914, one male; May 24, 1914, two males (E. P. Van Duzee). La Jolla, San Diego Co., Calif., June, 1916, six males and a female; August 1, 1917, one male (Geo. P. Engelhardt). Santa Monica, Los Angeles Co., Calif., May 28, 1916, male and two females (A. C. Davis), Los Angeles Co., Calif., July 8, 1916, male; Pasadena, Calif., July, 1917, male, and May, 1918, two males (Alonzo C. Davis). Santa Barbara, July 7, 1907, two males (Prof. Jas. S. Hine); San Jose, Calif., July 4, two males, one female (King), collection Dr. E. D. Ball; Polo Alto, Calif., male (C. H. Kennedy); Whitebird, Idaho, June 28, 1907, female (Dr. J. M. Aldrich). Two of the San Diego specimens have been identified as *consobrina* by Mr. Van Duzee, and several of the seven individuals from La Jolla approach typical *vanduzeei*.

Of variety *californica* the following have been examined: San Diego Co., Calif., July 9, 1913, male, collected and determined by Mr. Van Duzee; July 12, 1913, eight males; Aug. 3, 1913, one male (Prof. W. S. Wright); August, male, came to light. Pasadena, Calif., July 2, 1917, male (A. C. Davis).

In the JOURNAL OF THE N. Y. ENTO. SOC., March, 1915, Mr. Van Duzee suggests that *californica* may be a variety of *vanduzeei*, rather than a separate species as originally described.

**Okanagana striatipes** (Haldeman).

1852. Stansbury's Exploration and Survey of the Valley of the Great Salt Lake of Utah, p. 369, pl. 9, fig. 16.

No definite type locality is mentioned by Haldeman in the original description, which calls for an insect expanding 52 millimeters, with a prominent face; beneath yellow, end of rostrum, a few points near the joints of the feet and a transverse line at the base of the abdomen, black. The tergum is black with the margins of the segments yellow.

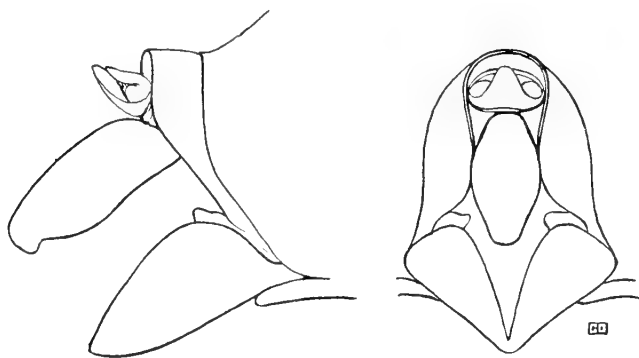
This is not an uncommon species in Utah, and neighboring states, and the following specimens have been examined: Honeyville, Boxelder Co., Utah, 1907, female (E. G. Titus), and Logan, Cache Co., Utah, July 13, 1907, male, collection Dr. E. D. Ball. Promontory Pt., Great Salt Lake, Utah, July 11, 1911, male (Dr. J. M. Aldrich), collection University of Idaho; Salt Lake City, Utah, male (Dr. Henry Skinner), Acad. Nat. Sci. Philadelphia; Stockton, Utah, July, 1913, two males; July, 1914, four males; July, 1915, female; Sept. 2, 1916, four males, all collected by Tom Spalding and in Davis collection. South Creek, Beaver Co., Utah, two males (Engelhardt), Davis collection. Cedar Creek, Iron Co., Utah, 5,500 ft., July 9, 1917, seven males (G. P. Engelhardt); Bellevue, Washington Co., Utah, 4,500 ft., June, 1917, and July 7, 1917 (G. P. Engelhardt), Davis collection. Kanab, Kane Co., Utah, June 24, 1913, two males, collection Dr. E. D. Ball. Flagstaff, Arizona, June 29, 1892, two males, Davis collection. In Mr. Van Duzee's Catalogue of Hemiptera, California and Oregon are also given as localities.

**Okanagana utahensis** new species. Pl. xx, fig. 4.

Type male from Cedar Creek, Iron Co., Utah, 5,500 ft., July 9, 1917 (Geo. P. Engelhardt), Davis collection.

Allotype female from Stockton, Utah, July, 1914 (Tom Spalding), Davis collection.

Resembles *striatipes*, but is larger and darker colored, and the



OKANAGANA UTAHENSIS

vestiture of the pronotum and mesonotum is not an appressed pubescence as in that species, but contains many long silvery hairs.



Head about as broad as the front margin of the pronotum; front more protruding than in most species of the genus; median sulcus well defined. Pronotum with the humeral angles rounded and the anterior angles prominent. Last ventral segment constricted at the sides, then broadened out to the extremity, which has the outer angles rounded and a sinus centrally. Uncus when viewed in profile hooked at the end; when viewed from behind, the book is seen to be notched. The last ventral segment in the female allotype is rather deeply notched. Venation of the fore wings testaceous, darker beyond the transverse fold. Costal margin of fore wing yellow to end radial cell, darker beyond; subcostal vein black, or nearly so in some of the paratypes; basal cell clouded, in some of the paratypes blackened; the vein (C<sub>2</sub>) on the inner side of the eighth marginal cell is usually light in color. Both pairs of wings variegated with black at base, with the membranes orange-red. Dorsum partly clothed with short silvery hairs, which are rather long in the cavities about the mesonotal X; in *striatipes* the hairs are short about the X and more golden in color. Beneath the vestiture is abundant, but the hairs are not long. Head black with the grooves and supra-antennal plates testaceous; beneath with the median sulcus orange; the transverse rugæ black; rostrum black, orange at base. Pronotum black, the grooves testaceous; bordered all around with orange, but more narrowly on the anterior margin. Mesonotum black, with the hind margin orange; the elevated X orange, variegated with black, and four orange spots arranged in a semi-circle in front of the X. Metanotum black, posteriorly margined with orange. Tergum black the eighth and ninth segments margined posteriorly with orange. Uncus black; in some of the paratypes there is a dorsal pale stripe. Beneath, black, the legs pale striped with black, and each abdominal segment edged posteriorly and on the sides with orange. In the allotype and some of the paratypes the black is reduced to an interrupted stripe on the central part of the abdomen, with a black spot each side on the segments. Valve pale variegated with black.

## MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	24.5	24
Width of head across eyes .....	8	8
Expanse of fore wings .....	60	64
Length of valve .....	3	

In addition to the type and allotype the following specimens have been examined, and unless otherwise stated, they are in the writer's collection.

Utah.—Logan, Cache Co., June 28, 1904, male, and male, July 13, 1907, collection Dr. E. D. Ball. Hyrum, Cache Co., July 27, 1904, two males, collection Dr. E. D. Ball. Wellsville, Cache Co., Utah,

July 3, 1904, male, collection Dr. E. D. Ball. Sandy, Salt Lake Co., Utah, July 3, 1908, collection Dr. E. D. Ball. Cedar Valley, Utah Co., Utah, male and female, collection Dr. E. D. Ball. Salt Lake City, June 13, 1897, male, Academy Nat. Sci. Philadelphia. Salt Lake City, two males and a female (Dr. H. Skinner), Acad. Nat. Sci. Philadelphia. City Creek Canyon, Salt Lake Co., July 4, male (Dr. H. Skinner), Acad. Nat. Sci. Philadelphia. Salt Lake, June 16, 1913, three males (L. P. Rockwood), Rockwood collection. Stockton, Tooele Co., July 21, 1913, female; July 31, 1913, female; July, 1914, two males, one female; September 2, 1916, two males and a female, all collected by Mr. Tom Spalding. Vineyard. Utah Co., Aug., 1917, two males, and July 2, 1918, male (Spalding). South Creek, Beaver Co., Utah, female (Engelhardt). Cedar Creek, Iron Co., 5,500 ft., July 9, 1917, two males (Engelhardt). Bucks Valley, Iron Co., female (Engelhardt). St. George, Washington Co., two males (Engelhardt).

Arizona.—Tuba, June, 1913, six males and one female (Dwight Franklin).

Idaho.—Payette, Canyon Co., male (Vastal), and Glenn's Ferry, Elmore Co., 1904, two males (Ewing), collection Oregon Agri. College.

Oregon.—Heppner, Morrow Co., July 11, 1906, three males, July 14, 1907, male; July 22, 1907, two males, and a female, all collected by Nettie Currin, and in the collection of the Oregon Agri. College. Ontario, Malheur Co., Sept. 3, 1905, female (Mallett). Oakland, Douglas Co., July 21, 1917, female, collection Oregon Agri. College. Riddle, Douglas Co., June 18, male, collection Oregon Agri. College.

Washington.—Logie Creek, Yakima Co., June 16, 1916, two males (C. H. Kennedy). Of these two males Mr. Kennedy writes, "they are from sage bushes and are a true desert species. They have a long shrill call, are shy, and hard to approach."

***Okanagana hesperia* (Uhler).**

1876. Bulletin U. S. Geological and Geographical Survey of the Territories, i, p. 342.

Uhler states that his type was collected in the vicinity of Denver City, Colorado, by C[yrus] Thomas.

This species has been placed in the same genus with *Tibicenoides*

*cupro-sparsus* (Uhler), but it has the marginal cells of the fore wings more nearly of the length of the ulner cells as in *Okanagana* generally, whereas in *Tibicinoides cupro-sparsus* the marginal cells are quite short. The following have been examined:

Colorado.—Denver, July 13, 1909, male; July 14, 1909, male, and July 16, 1909, three males (W. J. Gerhard), Davis collection. Denver, July 27, 1912, male, and June 10, 1913, female (Oslar), Davis collection. Golden, July, male and female (Oslar); July 18, 1909, male (W. J. Gerhard), Davis collection. Fort Collins, June 28, 1900, three males, and July 16, 1903, female, collection University of Kansas; June 28, 1900, three males, three females, and July 17, 1900, five males, collection Dr. E. D. Ball; July 16, 1903, male (Van Duzee), Davis collection. Platte Canyon, Jefferson Co., July, two males (Oslar), Davis collection. La Junta, Otero Co., two males (Oslar), Davis collection. Trinidad, Las Animas Co., July 15, 1910, female, and male and female without date (Oslar), Davis collection.

Kansas.—Trego Co., 2,450 ft., July 12, 1912, five males, one female; July 13, 1912, three males; July 17, 1912, male (F. X. Williams), collection University of Kansas.

New Mexico.—Albuquerque, male (Oslar); Silver City, male; Jemez Springs, 6,400 ft., June 28, 1918, male, June 24, 1919, female (John Woodgate), all in Davis collection.

Arizona.—Graham Mountains, July 7, 1914, male (E. G. Holt), collection U. S. Bureau of the Biological Survey.

Montana.—Billings, July 16, 1904, male; Custer, Aug. 1, 1912, male, and Miles City, July 1, 1915, three males, collection Montana Agri. Exp. Station.

***Okanagana pallidula* Davis.**

1917. Journal N. Y. Ento. Soc., xxv, p. 213, pl. 13, fig. 8.

Only the type and nine paratype males have been examined, all collected at Athlone, Merced Co., California, in July and August, 1917, by Alonzo C. Davis, as recorded in the original description.

***Okanagana uncinata* Van Duzee.**

1915. Journal N. Y. Ento. Soc., xxiii, pp. 27, 41.

1917. Journal N. Y. Ento. Soc., xxv, pl. 13, fig. 7.

The type locality for this species is Orange Co., California. Mr. Van Duzee has kindly sent me the type for examination, and also given me a paratype.

**Okanagana mercedita** Davis.

1915. Journal N. Y. Ento. Soc., xxiii, p. 16, pl. 3, fig. 8.

Only the type, the allotype and 16 males and 14 females from Merced Co., California, June 18, 1914, have been examined.

The short marginal cells in the fore and hind wings of this species, also in *O. minuta* and *Tibicinoides cupreo-sparsus* suggest a close relationship, and we think that they will ultimately be associated in the same genus. The supplementary transverse vein at the node is also more developed in *mercedita* and *minuta* than in most species of *Okanagana*, though not quite as well defined as in *cupreo-sparsus*, the type of the genus *Tibicinoides*.

**Okanagana minuta** Davis.

1915. Journal N. Y. Ento. Soc., xxiii, p. 17, pl. 3, fig. 6.

The original description was based on the type and 11 paratype males, all from Sanford University, California, May 26, 1914 (C. H. Kennedy), and a female, Fresno Co., California (J. C. Bradley). Mr. Alonzo C. Davis has sent me three males collected at Lebec, Kern Co., Calif., June, 1918.

**Tibicinoides cupreo-sparsus** (Uhler).

1889. Trans. Md. Acad. Sci., 1, p. 43.

This small, beautiful, black and red species has been included in the table as an aid to the identification of species, and as has already been stated, probably *Okanagana mercedita* and *O. minuta* should be transferred to the genus *Tibicinoides*. The types mentioned by Uhler were two females captured near Los Angeles, California, by D. W. Coquillett.

The following specimens are in the writer's collection, all from southern California: San Diego Co., May 6, 1914, two males, and May 24, 1914, three males (E. P. Van Duzee); San Diego, July, 1914, three males (Prof. W. S. Wright); La Jolla, June 10, 1915, three males (B. B. Fulton); Dulzura, San Diego Co., June 13-21, 1917, twenty males (Prof. W. S. Wright). In the collection of Dr. E. D. Ball, there is a male collected at Ontario, San Bernardino Co., June 12, 1908.

In the Transactions of the San Diego Society of Natural History, Vol. 2, p. 48, November, 1914, Mr. Van Duzee comments on this species as follows: "This very pretty little species was abundant this

season from April 26th until nearly the first of June. It occurs almost exclusively on a certain fine tufted grass, probably a *Poa*, growing on the hillsides about La Jolla and up Mission Valley and adjacent canyons as far as the Old Mission and perhaps farther. The bright red on the base of the wings gives this species a lively appearance when spread. Like *hesperia* Uhler it has the basal one half of the elytra infuscated. It has a shrill but feeble note which is long continued and easy to locate, but can rarely be heard for more than one hundred feet."

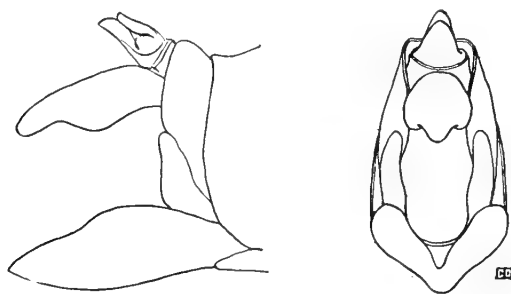
**Okanagodes** new genus.

In this genus the uncus is exposed as in *Okanagana* and the valve and wing venation are the same, but the pronotum is much narrower behind the eyes and the latter are exceedingly prominent. The front protrudes considerably and the supra-antennal plates are also prominent. The body is slim with the sides more parallel than in any known species of *Okanagana*. The type of the genus is the new species described below and figured on the accompanying plate.

**Okanagodes gracilis** new species. Pl. xx, fig. 6.

Type male and allotype female from Washington Co., Utah (Weidt). Davis collection.

A slim species the body in size about as in *Okanagana synodica*, but the



OKANAGODES GRACILIS

sides are more parallel and the wings are proportionately longer. Eyes vary prominent; fore part of pronotum considerably narrowed. The front is also very prominent with the median sulcus at first indistinct but lower down well developed; the supra-antennal plates are much enlarged. The result of these characters is to give the front of the head, when seen from above, a more uneven outline than in any *Okanagana* studied. The hook at the end of the

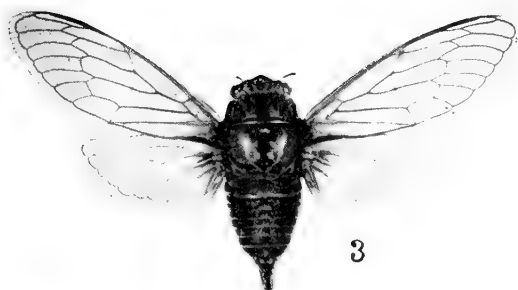
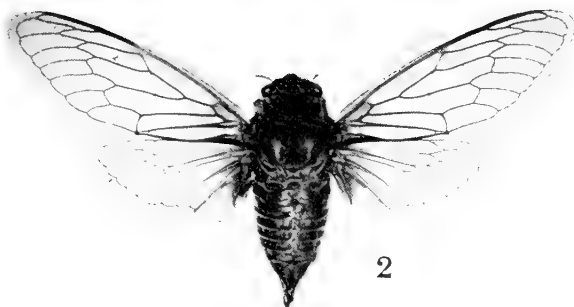
uncus is not much bent and it has no terminal notch. The opercula are small and the song apparatus plainly exposed. The comparatively few hairs on the underside of the abdomen are short and light colored; the last ventral segment is pubescent, constricted at the sides and rounded at the extremity. The insect is almost wholly straw-colored covered with a whitish pubescence; the eyes are darker and the ocelli are large and ruby colored. The transverse rugæ are darkened; there is an inverted V-shaped mark on the front between the supra-antennal plates. Pronotum with a dark-colored hour-glass-shaped spot centrally; the grooves darkened, and the posterior margin light-colored. Mesonotum with four cuneiform dark spots stretching backward from the anterior margin, the inner pair (the W-mark) not as long as the outer pair. A dark line extending from the base of each fore wing backward to the elevated  $\times$ ; two small dark spots at the anterior extremities of the  $\times$ . Metanotum with a small dark elongate spot near the base of each hind wing and a more rounded one above each tympanum. Abdomen with the segments darkened at the base, but not on the sides. The costal margin of the fore wings straw-colored to the end of the radial cell, darkened beyond, the remaining veins and about the outer half of the wing also darkened. Basal cell clear. The anal membranes of the fore and hind wings are whitish, those of the hind wings include a clouded spot. Beneath there is a small elongate shining black spot each side near the base of the rostrum, which itself is blackened at the extremity. There is a dark spot at the base of each wing and dark lines at the base of the legs; the claws and spines of the legs also darkened. The usual dark spot centrally at the base of the abdomen. The allotype is colored as in the type except that there is a small dark spot at the side on each abdominal segment from the third to the seventh, and also a fainter one not in line with the others on segment eight. The notch in the last ventral segment is simple.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	19.5	20
Width of head across eyes .....	5	5.5
Expanse of fore wings .....	48	52
Length of valve .....	3	

In addition to the type and allotype another male and female from the same locality and without date, are in the writer's collection, as is also a male from Maricopa, Pinal Co., Arizona, July 3, 1918, collected by A. M. Gaudin. This last has the body almost wholly straw-colored and shows but faintly or not at all the darker marks described in the type. In the collection of the Bureau of the Biological Survey, U. S. Department of Agriculture, there are eighteen males and five females, collected at Higley, Arizona, July 17 to 25, 1917, by E. G.





Cicadidæ.



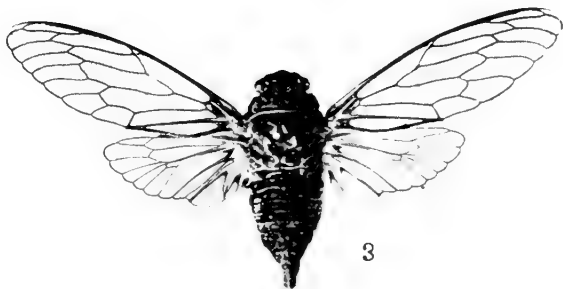




1



2



3



4



5



6

Cicadidæ.

Holt. This series has individuals marked as in the type and others that are almost wholly straw-colored.

Several of the species of the allied genus *Clidophleps*, which comes next in the catalogue, were figured in the JOURNAL OF THE N. Y. ENTOMOLOGICAL SOCIETY, March, 1917.

#### EXPLANATION OF PLATES.

##### PLATE XIX.

- Fig. 1. *Okanagana magnifica* Davis. Type.
- Fig. 2. *Okanagana cruentifera* (Uhler).
- Fig. 3. *Okanagana lurida* Davis. Type.
- Fig. 4. *Okanagana napa* Davis. Type.

##### PLATE XX.

- Fig. 1. *Okanagana bella* Davis. Type.
- Fig. 2. *Okanagana rimosa* (Say).
- Fig. 3. *Okanagana canadensis* (Provancher).
- Fig. 4. *Okanagana utahensis* Davis. Type.
- Fig. 5. *Okanagana balli* Davis. Type.
- Fig. 6. *Okanagodes gracilis* Davis. Paratype.

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## NEW SPECIES OF SERICA (SCARABÆIDÆ)—II.

BY R. W. DAWSON.

LINCOLN, NEBRASKA.

### *Serica sponsa* new species.

Male.—Length, 8–9 mm., width, 4.5–5 mm. Color varying from light chestnut-brown to nearly black, highly polished and shining.

Clypeus with discal area either continuous with the convexity of the front or broadly and slightly raised above its plain. Anterior margin of clypeus rather suddenly and strongly elevated, lateral margins less so; lateral incisure rather variable, but usually narrow and deep, entirely dividing the elevated margin. Punctuation of clypeus moderately coarse and unusually dense, the punctures coalescent to separated by half their own diameters; the dense, rough punctuation obscuring and in some cases nearly effacing the fine clypeal suture. Punctures of front a little coarser than those of the clypeus and less regularly and densely placed. Antennal club small and short, but little exceeding half the total length of the antenna. Eyes small. Measure-

ments of head as follows: Diameter of head through eyes, 23;<sup>1</sup> distance

Pronotum less convex than usual, with its width well carried forward to the anterior third or fourth of its length, then broadly rounded to the anterior angles. Both anterior and posterior angles obtusely rounded. Punctuation coarse and quite evenly distributed over the whole surface; the punctures separated on the average by about their own diameters. The measurements of the pronotum are as follows: Width through the posterior angles, 41; width through the anterior angles, 24; length on the median line, 22. Scutellum, except the apex, coarsely and closely punctured, the punctuation often less dense through the center. Length, 10; width, 11.

Elytra furrowed as usual, but less strongly so than in *cucullata* and *elusa*, the costæ rounded, and the sulci not sharply defined. Sulci with three confused rows of coarse punctures which show very little tendency to coalesce laterally. Length of elytra, 70; width 50.

Metasternum and posterior coxal plates very coarsely and rather densely punctate. Punctures of abdominal sternites but little more than half as large as those of the coxal plates, but more closely set. Sixth sternite and apex of pygidium opaque and thinly covered with erect, golden-brown setæ. Pygidium coarsely and densely punctured. The usual, single rows of stiff setæ on the sternites inconspicuous, the setæ small and the rows traceable principally by the somewhat coarser punctures which bear them. Erect setæ of metasternum, however, well developed and conspicuous, arranged in confused double rows on each side of the median, impressed, longitudinal line, which is closely approximated on each side by a line of fine, longitudinally confluent punctures.

Genital armature of male (Pl. XXI) with exceptionally large, asymmetrical claspers; length 2.6 mm.

Female.—Almost an exact counterpart of the male; the most reliable characters for its identification being the slightly less emarginate sixth ventral sternite, and the more convex under line of the abdomen. Antennal club scarcely perceptibly smaller than that of male. Facial punctuation denser and rougher, with the clypeal suture more nearly effaced and the clypeal incisure often less strongly developed than in the male.

Type: ♂ Ithaca, New York, April 30, 1916 (S. H. Emerson).

Allotype: Millers, Indiana, July 19, 1916.

Paratypes: 6 ♂, 7 ♀:

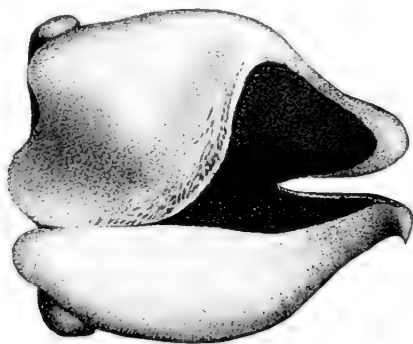
New York: Catskill 1 ♂.

New Jersey: South Orange 2 ♂.

Ohio: Cincinnati 1 ♀.

Indiana: Lafayette 1 ♂, 2 ♀; Jackson County 1 ♀.

<sup>1</sup> The unit of measurement used is one tenth of a millimeter.  
between inner eye margins, 14; length of head on median line, 18; extreme width of clypeus in front of incisure, 11; antennal club, 6; dorso-ventral diameter of eye, 8.



Serica.



Iowa: Iowa City 1 ♂, 3 ♀; New Liberty 1 ♂.

*Sponsa* is most readily distinguished from the other *respertina*-like *Sericas* by its coarse, dense puncturation, especially on the face where it tends to obscure the clypeal suture, and by the small antennal club of the male. Mr. Blatchley's species *evidens*<sup>2</sup> is the most closely allied species at present known to the writer. It also has very dense facial puncturation and the small antennal club in the male, but differs from *sponsa* at a glance, by the sharp carination of the median line of the front and of the clypeal suture, also by the less uniform and remarkably dense puncturation of the pronotum especially toward the sides of the discal area. *Evidens* is the only species at hand in which the male genital armature is at all comparable to that of *sponsa*, but even here the resemblance is not close.



## RECORDS AND NEW SPECIES OF CARABIDÆ.

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

While identifying some Carabidæ belonging to Mr. C. W. Leng, a number of species were discovered which seemed to be undescribed. These with some others, part of a collection acquired from Mr. Gustav Beyer, and one species of *Patrobis* collected in the Adirondack Mountains during the summer of 1918, form the material for the following descriptions. The species in the Beyer Collection had been marked new or left with blank labels, with the exception of one species of *Harpalus*, which was found under the label *Harpalus herbivagus* Say. With the descriptions are included a number of records from the Beyer Collection which seem of interest in extending the known range of a number of species.

### ***Pachyteles beyeri* new species.**

Form very elongate, parallel; color dark castaneo-piceous, nearly black, finely alutaceous and subopaque; palpi, antennæ and legs rufo-piceous. Head two fifths longer than wide, five sixths as wide as the thorax, as wide as the thorax at apex; very sparsely but deeply and strongly punctate; front rugose,

<sup>2</sup> Canadian Entomologist, L.I, p. 153; new name for *carinata*.

strongly bi-impressed, impressions triangular; clypeus with three shallow impressions, the median one anterior; penultimate joint of the maxillary palpi very short, quadrate, terminal joint, cylindrical, truncate; terminal joint of the labial palpi broad, triangular, slightly shorter than the penultimate; mentum deeply emarginate with a large acute tooth; ligula narrow, bisetose at apex, paraglossæ equal in length broadly rounded at apex; antennæ short, stout, not reaching the base of the thorax, outer joints very little longer than wide, joints six to eleven strongly compressed, four basal joints glabrous. Thorax one fourth wider than long, five sixths as wide as the elytra, distinctly narrower at base than at apex, apex emarginate, base feebly bisinuate, squarely truncate; sides broadly rounded in front, broadly sinuate in front of the posterior angles, all the angles strongly rounded, the anterior slightly obtuse, prominent but not produced, the posterior nearly rectangular; side margins broad, strongly reflexed, wider in front and behind; basal foveæ not distinct; transverse impressions strong, the anterior rugose; median line fine, strongly impressed, abbreviated before and behind; a row of strong, coarse punctures along the anterior margin, disk punctate as the head, punctures smaller and less distinct. Elytra three times as long as the thorax, nearly three times as long as wide, basal margin inferior; sides parallel to apical fourth, thence strongly rounded to the apices, which are separately rounded, sinuation distinct; striæ feeble, intervals sub-carinate with single rows of very indistinct, widely spaced punctures, those on the inner intervals almost indistinguishable. Abdomen punctate-setose, punctuation elsewhere on the underside, sparse and indistinct. Anterior femora with a strong tooth on the lower edge at basal two fifths; tibiæ and tarsi pubescent; fourth tarsal joint slightly emarginate; claws slender, simple; tibial spurs very short. Length, 14 mm.; width, 3 mm. 1 ♂.

Male: First two joints of the anterior tarsi moderately dilated and squamulose beneath; lateral margin of the elytra sharply expanded at apical fourth.

San Felipe, Low. Cal. (Beyer).

Of the many species in this genus described from Mexico and South America, one only of those with dentate anterior femora has rounded posterior thoracic angles. This species, *P. morio* Klug (Ann. Soc. Ent. Belg., 11, 1867-1868, p. 52) is larger (16-17 mm.), with differently proportioned head and thorax, the thorax with the anterior angles produced. *P. parca* Lec. (Tr. Am. Ent. Soc., XII, 1885, p. 2) from Arizona is of the same size and general form, but the thorax is described as "as long as wide, with the dorsal line entire, . . . front angles somewhat acute," elytra with interspaces "each with a row of well-marked distant punctures." It is not stated that the thoracic angles are rounded, which would be a strange omission in describing the present species. (The description of *P. unicolor* Fairm. from Chili could not be found.)



**Bembidium nevadense** Ulke.

Placer Co., Cal. Through C. V. Riley, 1888. 2 specimens.

This species is recorded from Reno, Nevada, by Casey and from Cal. and Or. by Hayward.

**Bembidium consanguineum** Hayw.

Or. 1 specimen.

This species is recorded from New Mexico, Colorado (Boulder Co.), Utah (Southwestern), Arizona (Tucson and other parts) by Casey, and from Cal., Utah, Ariz., Col., Guadalupe Isd. by Hayward.

**Bembidium micans** new species.

Form oblong, parallel, moderately convex; color black, very shining, head and thorax very faintly æneous, an indistinct spot on the humerus and a submarginal one at apical two fifths dull testaceous. Head as wide as the thorax at apex; eyes large; frontal sulci single, straight, parallel, not deep; antennæ reaching the basal third of the elytra. Thorax obtapezoidal, one half wider than long, base as wide as the apex, moderately convex, sides moderately rounded in front, very slightly sinuate in front of the posterior angles which are sub-rectangular; margin rather broad, narrowly reflexed at edge; basal foveæ strong, bistriate, rugose, carinæ long and sharply defined; anterior impression distinct; median line strong, slightly impressed, abbreviated in front and behind. Elytra one half wider than the thorax, parallel, three fifths longer than wide, strongly arcuate from apical third to the apex, humeri subangulate; striæ very fine, abbreviated at apex, finely punctate on basal half, the seventh obsolete, represented at base by a row of very indistinct punctures, eighth very deep and indistinct from the margin; two impressed punctures on the third stria at basal one third and apical two fifths. Length, 5-5.5 mm.; width, 1.8-2 mm. 1 ♂, 1 ♀.

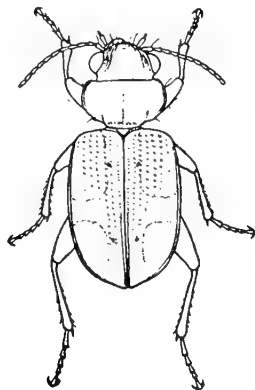
Dallas, Ore. Collection C. W. Leng.

In Col. Casey's recent revision of *Bembidium* (Mem. Col., VIII, 1918), this species would be placed with *lugubre* Lec., because of its maculate elytra and trapezoidal thorax. It seems, however, most closely related to *nitens* Lec. (*grapei* Gyll.), because of its highly polished integuments and finely punctured and indistinct striæ. In Mr. Hayward's arrangement of the genus, it would be placed near *breve* Mots., from which it differs by its maculate elytra.

**Bembidium dilaticolle** new species.

Form rather broad, sub-depressed. Color black, head and thorax slightly greenish metallic, elytra pale testaceous, the suture and a transverse fascia behind the middle blackish piceous; palpi, antennæ and legs pale rufo-testa-

ceous. Head wider than long, wider than the thorax at apex; eyes very large strongly convex; frontal sulci strongly convergent but not joining at the clypeal margin, a short outer sulcus on either side and two smaller sulci within; mentum with a strong entire tooth; antennæ short, reaching the base of the thorax, joints sub-equal, twice as long as wide. Thorax strongly convex, twice as wide as long, smooth, impunctate, three fourths the width of the elytra; sides strongly rounded, anterior and posterior angles not distinct; basal transverse impression strong, beaded, close to the posterior margin; basal foveæ linear, short, strongly impressed, distant from the angles which are not cari-



nate; anterior impression distinct; median line scarcely visible; side margin moderate, edge reflexed. The distance between the basal setæ is very slightly less than the width of the thorax at apex. Elytra three times as long as the thorax, one half longer than broad; disk slightly depressed; sides moderately and evenly arcuate from the rounded humeri to the apical one third, thence strongly rounded to the apex; basal margin entire below the disk. Sutural striæ strong only on the apical third, the remaining very indistinct, their positions marked by six rows of coarse punctures, obliterated behind the middle; the punctures of the other rows are larger than those of the inner; the eighth stria is indistinct from the margin and very strongly impressed; two impressed punctures on the third interval near the third stria at basal fourth and apical third. Length, 3.5 mm.; width, 1.45 mm. 1 ♀.

Huachuca Mts., Ariz., 7-'05. (Beyer.)

This species would be placed in Group XIII, *sphaeroderum* (*Cyclolopha*) of Col. Casey's revision, but differs from the species therein described by its broader thorax and maculate elytra. It also differs from *B. cyclodes* described by Bates from Southern Mexico (Biol. Cent. Am. Col., i (I), p. 290) in form, maculation and elytral sculpture.

**Bembidium constricticolle** Hayw.

Rincon Mts., Ariz., 7-'07. (Beyer.) 2 specimens.

This species is recorded from Colorado Springs by Casey and from the San Juan River, New Mexico and Winslow, Arizona, by Hayward.

**Tachys rectangulus** new species.

Form elongate-oval, convex. Color rufo-testaceous, head and thorax darker; elytra iridescent with an indefinite median cloud slightly behind the middle. Head as wide as the thorax at apex; eyes flattened, not prominent; antennæ long, reaching the basal third of the elytra, joints five to seven, three times as long as wide; mentum with two forameniform punctures. Thorax one third wider than long, base and apex equal in width; sides strongly rounded on the apical half, oblique and straight behind to the basal sixth, where they are suddenly sinuate; anterior angles not evident, posterior angles long, rectangular and reflexed, base slightly oblique either side. Elytra elongate-oval, widest at the middle, three times as long as and one fifth wider than the thorax; sides evenly arcuate throughout, humeri rather narrow; two inner striæ distinct, impunctate, eighth broadly interrupted at the middle; recurved portion of the sutural striæ parallel with the suture, hooked at apex with a puncture within the hook; anterior puncture at basal third. Length, 2.75 mm.; width, 1 mm. 1 ♂.

Male: Two basal joints of the anterior tarsi dilated, with the inner apical angles prolonged.

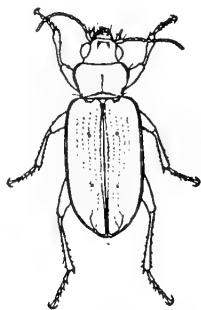
North America, locality uncertain. Collection C. W. Leng.

This species resembles *T. proximus* Say, but is more elongate and the thorax is larger and less transverse with prominent rectangular posterior angles.

**Tachys conjugens** new species.

Form elongate, subparallel, depressed. Color rufo-testaceous, eyes black. Head as wide as long, wider than the thorax at apex, eyes moderately large and convex; frontal impressions short, broad and shallow, not extending on the clypeus; mentum strongly emarginate, tooth strong with a broadly rounded apex; forameniform punctures absent; antennæ moderately long and slender, reaching basal one fourth of the elytra, joints sub-equal, basal joint stouter, two, three and four more slender, the others twice as long as wide, slightly compressed. Thorax one third wider than long, two thirds as wide as the elytra, widest at apical third; base as wide as the apex; sides strongly rounded in front, slightly sinuate at basal third, thence straight and slightly oblique to the obtuse and sharply defined posterior angles; anterior angles not defined, apex slightly emarginate, posterior transverse impression strong, angulate at middle and punctate; base margined, basal area faintly rugose;

anterior transverse impression indistinct, median line distinct, abbreviated before and behind; side margins moderate, edge reflexed. Elytra three times as long as the thorax, twice as long as wide; sides straight and nearly parallel to the apical third, thence moderately arcuate to apex; disk with five distinct



and punctured striae, sixth represented by a row of indistinct punctures; the second and third curve out at apex and join the incurved portion of the sutural stria, which is strongly marked and parallel to the suture and not hooked; the second and third striae are indistinct where they join the incurved sutural; eighth stria broadly interrupted at the middle. Two impressed punctures on the third stria. Length, 2.75 mm.; width, 1 mm. 2 ♀.

Rincon Mts., Ariz., 7-'07. (Beyer.)

This species with the form of the group *vittiger* belongs by its structural characters in the group *incurvus* (*Tachyura* Mots., *Barytachys* Chaud.). In Col. Casey's arrangement of *Tachyura*, it would be placed next to *tripunctatus* Say from which it is distinguishable by the absence of the three basal thoracic punctures. In Hayward's arrangement it would be placed next *ferrugineus* by its distinctly punctured striae. It is distinguishable from *ferrugineus* by its elongate and depressed form and more numerous striae.

*T. conjugens* agrees with the description of *T. curvans* Bates (Biol. Cent. Am., i (I), p. 143) from Guatemala with the exception of the incurved portion of the sutural stria which in *curvans* Bates states to be visible only "under a high power of the microscope." In *conjugens* it is as strong as in any of the North American species of the subgenus *Tachyura*. Bates also states: "A species very closely resembling this (*curvans*) but having a rather narrower and more cordate thorax, has been sent to me from California as *Tachys* n. sp. by Mr. H. K. Morrison." No such species has been described. It may be that *conjugens* is the one referred to.

***Patrobus longipalpus* new species.**

Form elongate-oblong, depressed. Color black, moderately shining, antennæ, palpi, tibiæ and tarsi rufo-piceous. Head one third longer than broad, as wide as the thorax at apex, basal constriction not evident; eyes moderately prominent; frontal impressions long, deep, extending on the clypeus, a few indistinct rugæ behind the eyes; mandibles prominent; third joint of the maxillary palpi long, slender, subcylindrical, not wider at apex, one half longer than the second; terminal joint of the labial palpi shorter and stouter, penultimate joint bi-setose in front; mentum moderately and broadly emarginate with a short, deeply bifid tooth; antennæ moderately slender, first joint short and stout, less than twice as long as wide, third nearly three times as long as the second, fourth to eleventh shorter, subequal, more than twice as long as wide, two basal joints glabrous. Thorax one half wider than long, as wide at base as at apex, depressed, sides slightly rounded in front with a distinct sinuation or flattening at apical one third, anterior angles slightly prominent, broadly rounded; oblique behind and broadly sinuate at basal third, posterior angles slightly obtuse, not rounded; margins moderately wide, edge narrowly reflexed; basal foveæ, broad, oblique, indistinct, strongly rugose, transverse impressions indistinct, coarsely and sparsely punctate and rugose; base oblique at either side. Elytra three times as long as the thorax and one fourth wider; basal margin below the disk; humeri sub-angulate, sides nearly straight and parallel to apical two fifths, thence evenly arcuate to apex; striæ moderately strong, finely and distinctly punctate on basal half, intervals slightly convex; three impressed punctures on the third stria; sterna sparsely punctate. Legs moderate, femora moderately stout, tibiæ scarcely wider, at apex; posterior trochanters two fifths the length of the femora, with rounded apices. Length, 10 mm.; width, 3.5 mm. 1 ♂.

Keene Heights, Essex Co., N. Y., 6 July, 1918. (Notman.)

This species may be distinguished from *P. rugicollis* by its smaller size, broader and more rugose thorax and by the long terminal joint of the maxillary palpi, differing from the terminal joint of the labial palpi. It may be distinguished from *P. septentrionis* by its broad depressed and rugose thorax.

***Pterostichus lævilatus* new species.**

Form oval, slightly elongate, slightly convex. Color black, strongly shining, elytra dark piceous, slightly bronzed, mandibles, palpi, antennæ and legs rufous. Head as wide as the thorax at apex, as long as wide; frontal impressions broad, not deep, rounded and sparsely and indistinctly punctate; palpi subcylindrical, truncate at apex; mentum with a broad bifid tooth. Thorax one fourth wider than long, three fourths as wide as the elytra, widest before the middle; base equal in width to the apex; sides broadly rounded, strongly sinuate at basal one sixth, thence straight to the sharply rectangular

posterior angles; anterior angles rounded, not prominent, apex slightly emarginate; basal foveæ broad, shallow, coarsely punctate, strongly bistriate, inner striæ longer, angles strongly carinate; transverse impressions indistinct; median line, strong, abbreviated before and behind; side margins narrow with narrowly reflexed edge, the usual two setæ on either side at posterior angles and apical one fourth. Prosternum not margined at apex. Elytra two and one half times as long as the thorax; two thirds longer than wide, widest at middle, slightly wider than the thorax at base, humeri sub-dentiform; sides strongly and evenly rounded from humeri to apex; striæ strong and distinctly punctate, outer striæ less distinct, scutellar striæ very short; two small punctures on the second stria, one slightly before the middle and the other at apical one fourth. Metasternal side-pieces short, slightly longer than wide. Three basal joints of the posterior tarsi grooved on the outer side. Length, 9 mm.; width, 3.5 mm. 1 ♀.

Golden, B. C. Collection C. W. Leng.

This species seems closely related to the species of the subgenus *Omaeus*. The short metasternal side-pieces and short scutellar striæ would associate it, however, with the species *tumescens*, *obscurus* and *ventralis* of section B of the third division of Leconte's synopsis. The strongly oval, somewhat ventricose elytra and indistinct outer striæ also indicate a relationship with these species. The bipunctate second elytral striæ would distinguish it from either of these groups.

***Amara humilis*** Casey.

Rockaway B., L. I., May 15, 1910. (W. T. Davis.) Ramsey, Bergen Co., N. J., May 30, 1917. Keene Valley, Essex Co., N. Y., May 24, 1916, June 18, 1917. Johnstontown, Rockland Co., N. Y., April 28, 1918. Greenwood Lake, Passaic Co., N. J., and Orange Co., N. Y., May 5, 1918. (Notman.)

This species, recently described by Casey (Mem. Col., VIII, p. 302), is recorded by him from Rhode Island (Boston Neck) and Long Island (Huntington and Wyandanch)—Schott.

***Platynus imitans*** new species.

Form oblong, subdepressed. Color piceous, palpi, antennæ, legs and margins of the thorax pale rufo-piceous; impunctate, shining. Head longer than wide, three fourths as wide as the thorax, as wide as the thorax at apex; frontal impressions broad, shallow, indefinite; antennæ long, slender, reaching the middle of the elytra, outer joints four times as long as wide, pubescence beginning on the fourth joint. Thorax as long as wide, as wide at base as apex, three fifths as wide as the elytra, apex distinctly emarginate, base arcuate; sides broadly and evenly arcuate from base to apex; anterior angles

sub-prominent, rounded, posterior angles rounded; side margins, moderately broad, slightly wider and more strongly reflexed behind; anterior transverse impression indistinct, posterior distinct; median line strong, sub-entire; basal foveæ large, round, indistinct, indistinctly rugose and finely alutaceous. Elytra two and one half times as long as the thorax, one and one half times as long as wide; humeri broadly rounded; sides nearly straight to apical one third, thence strongly rounded to the apex, indistinctly sinuate at apex; striæ deep, distinctly crenate-punctate; intervals convex, smooth, strongly shining, third interval with three punctures, first at basal fourth on the third stria, second and third behind the middle on the second stria. Legs moderate in length, tarsi of the intermediate and posterior pairs, strongly grooved. Length, 6.5 mm.; width, 2.5 mm. 1 ♂.

North America, locality uncertain. Collection C. W. Leng.

This species seems best placed with *P. collaris* Say in section D of Leconte's synopsis, from which it would differ by its color, small size, and narrower thorax.

**Platynus foveiceps** new species.

Form elongate-oblong, depressed. Color black, shining, bronzed with a purplish tinge. Head slightly longer than wide, as wide as the thorax at apex, strongly longitudinally rugose, either side, with a punctiform impression over either eye; antennæ slender, reaching the base of the thorax, second joint shorter, outer joints three times longer than wide. Thorax one fifth wider than long, three fourths the width of the elytra, as wide at base as at apex, widest before the middle; sides rounded in front, nearly straight and oblique behind to the strongly rounded posterior angles; anterior angles rounded, not prominent; apex slightly emarginate; basal foveæ distinct, linear, angles with a strong blunt tubercle; side margins narrow, very slightly broader and reflexed behind; transverse impressions obsolete; median line strong, entire or nearly so, surface strongly transverse-rugose throughout. Elytra as wide as the thorax at base, two and one half times as long, twice as long as wide; humeral angles broadly rounded, sides moderately and evenly arcuate to near the apex, thence strongly arcuate and faintly sinuate to the apex; striæ moderately fine, impunctate, intervals flat, third with six impressed punctures, first on the third stria. Tarsi grooved. Length, 9.5 mm.; width, 3.5 mm. 1 ♀.

Franktown, Nevada. Collection C. W. Leng.

This species resembles *P. fossiger*. It may be distinguished by the strongly rugose head and thorax, the punctiform impressions on the occiput, the basal thoracic tubercles and the thorax flatter behind the middle.

**Coptodera unicolor** Chev.

Rincon Mts., Ariz., 5,000 ft., 7-'07. (Beyer.)

This species is recorded from Orizaba, Mexico, by Chevrolat (Col. Mex., 2d fasc., mars, 1834, No. 40), from Mexico by Chaudoir (Ann. Soc. Ent. Belg., 12, p. 179), and from Arizona by Schaeffer (Sc. Bull., Mus. Br. Inst., V. 1, No. 17, p. 400).

**Plochionus bicolor** new species.

Form rather broad, depressed, widest near the apex of the elytra. Color rufo-testaceous, elytra excepting the margins, black. Head as long as wide, three fourths as wide as the thorax; eyes very large and convex; neck constricted behind the eyes; frontal impressions shallow, indistinct, longitudinally rugulose; labrum broad, truncate at apex, slightly narrowed to the base, angles rounded; terminal joint of the maxillary palpi, slender, cylindrical, of the labial palpi wider and obliquely truncate at apex; mentum with an acute tooth; antennæ rather short, reaching the base of the thorax, second joint short, five to ten stouter, parallel, one and one half times as long as wide, terminal joint subequal to the preceding two; four basal joints glabrous. Thorax depressed, twice as wide as long, widest at middle, two thirds as wide as the elytra, width at apex scarcely more than one half that at base; sides strongly and evenly rounded to behind the middle, thence nearly straight to the base; anterior angles completely rounded, posterior angles obtuse but distinct, base faintly bisinuate at middle; side margins broad and depressed, much broader behind, slightly undulate with the edge slightly reflexed before the middle; impressions indistinct, median line abbreviated before and behind, surface, sparsely transverse-rugose. Elytra strongly depressed, three times as long as the thorax, one half longer than wide, as wide as the thorax at base; humeri broadly rounded; sides very slightly arcuate to apical fifth, thence rounded and truncate to apex; striæ fine, intervals convex, finely, very sparsely and irregularly punctate; third interval with two setiferous punctures, one at basal one fourth, the other at apical one fifth. Fourth tarsal joint very deeply emarginate, claws pectinate. Length, 6 mm.; width, 2.5 mm. 2 ♂.

Key Largo, Fla. (Beyer.)

This species is distinctly narrower in form than *P. dorsalis* Horn.

**Apenes hilariola** Bates.

Santa Rosa, Low. Cal. (Beyer.)

This species is recorded by Bates from Cuernavaca, Colima City, Mex. (Tr. Ent. Soc. Lon., 1891, p. 271).

**Harpalus cyrtonotoides** new species.

Form oblong, parallel, slightly elongate, slightly convex. Color dark piceous, strongly shining; palpi, antennæ, legs and margins rufous. Head as



wide as the thorax at apex, wider than long, three fifths as wide as the thorax; eyes rather small, but convex and prominent; frontal impressions very small, perforate punctate, in contact with the clypeal suture which is slightly incurved either side; mentum tooth short with broadly rounded apex; antennæ short and slender, not reaching the base of the thorax. Thorax rather large, two fifths wider than long, widest in front of the middle, scarcely narrower than the elytra, base slightly wider than the apex; sides strongly rounded in front, nearly straight and distinctly convergent behind to the rather narrowly rounded posterior angles; apex distinctly emarginate, anterior angles rather broadly rounded; base very distinctly and broadly emarginate, posterior angles distinctly inclined backwards; disk moderately and evenly convex from side to side; transverse impressions sub-obsolete; marginal gutter narrow and even in width throughout; basal foveæ linear and deep, slightly impressed with a few coarse punctures, area between the foveæ and the angles convex and impunctate; marginal gutter with an irregular row of coarse punctures extending nearly to the middle; basal margin interrupted at the middle. Elytra slightly wider than the thorax at base and twice as long, one half longer than wide; sides very broadly and evenly rounded to apical one fourth, thence strongly rounded and oblique to apex, sinuation very feeble; striæ, strong, deep; intervals convex, impunctate, a puncture on the second stria at apical third. Accessory abdominal setæ absent; abdomen punctured between the coxæ. Length, 9.25 mm.; width, 3 mm. 2 ♂.

Col. (Collection C. W. Leng.)

This species is closely allied to *spadiceus* Dej. It may be distinguished by its broader thorax with base emarginate and the basal margin interrupted at the middle. It seems also closely allied to *æquabilis* Csy. (Mem. Col., V, p. 100), one of several grouped together by a short broadly rounded mentum tooth, also found in *spadiceus* Dej. The proportions are similar but certain features of the thorax are not in accord—the marginal gutter even in width throughout, basal angular are moderately convex and impunctate and the conformation of the base. The row of coarse punctures in the marginal gutter could scarcely be overlooked and none is mentioned in *æquabilis*.

**Harpalus cordifer** new species.

Form oblong, elongate. Color black, shining (♂), slightly alutaceous (♀), elytra dark piceous, epipleuræ and margins paler; palpi, antennæ and legs dark rufous, tarsi darker. Head wider than the thorax at apex, wider than long, four fifths the width of the thorax; frontal foveæ punctiform, deep, broadly impressed; clypeal suture very distinct connecting the foveæ, but indistinct between the latter and the margins of the head; eyes rather small but prominent; mentum with a narrow, acutely pointed tooth; antennæ surpassing the

base of the thorax; joints more than twice as long as wide. Thorax one third wider than long, four fifths the width of the elytra, as wide at base as at apex, widest slightly before the middle; sides broadly rounded in front, broadly sinuate and oblique behind to the sub-rectangular and not rounded posterior angles; apex moderately emarginate, base distinctly, but less emarginate than the apex; side margin narrow, not expanded basally; basal margin distinct and entire; transverse impressions indistinct, median line strong, abbreviated in front; basal foveæ deep, linear, broadly impressed, coarsely rugose-punctate; basal third of the disk coarsely punctate, the rest with sparse, fine and rather indistinct punctuation. Elytra wider than the thorax at base and two and one half times as long, nearly twice as long as wide, evenly elongate-oval, apical sinuation strong and abrupt; striæ deep, intervals moderately convex, impunctate; third interval without impressed punctures. Abdomen without accessory setæ; indistinctly punctate between the coxæ. Length, 7.5-8.75 mm.; width, 3-3.5 mm. 3 ♂, 1 ♀.

Br. Col. (Beyer.)

This species is closely allied to *H. retractus* Lec. It differs by its much smaller size, larger head, longer and more strongly punctured basal area of the thorax with deep linear foveæ, and its narrow and acute mentum tooth.

**Anisodactylus depressus** new species.

Form oblong, somewhat broad, depressed. Color black, shining in both sexes; palpi and antennæ rufous, legs dark rufo-piceous; tarsi paler. Head broader than long, two thirds as wide as the thorax, slightly narrower than the thorax at apex; frontal foveæ punctiform, broadly impressed, slightly removed from the clypeal suture, which is very fine; eyes rather large but flattened, not prominent; ligula narrow, not wider at apex and bisetose, paraglossæ much broader and longer, apex broadly rounded; mentum with a short but distinct tooth; antennæ slender, extending beyond the base of the thorax, outer joints three to four times as long as wide, three basal joints glabrous. Thorax twice as wide as long (♂), slightly less (♀), four fifths as wide as the elytra, slightly narrower at apex than at base, widest at middle; sides broadly and evenly rounded throughout; apex very slightly emarginate, anterior angles not at all prominent, broadly rounded; posterior angles slightly obtuse, very narrowly rounded; side margins rather broad, widening rapidly from the middle and disappearing at basal one third in the general depression of the posterior angles; basal impressions large, shallow and indefinite, not distinctly punctate, but rather strongly rugose; anterior transverse impression strong, basal indistinguishable median line nearly obsolete. Elytra depressed, three times as long as the thorax, more than two thirds longer than wide; sides very slightly arcuate to apical third, thence strongly rounded to the apex, apical sinuation distinct; striæ strong, intervals broadly convex; an impressed puncture adherent to the second stria at apical one fourth. Body beneath impunctate.

Anterior tibial spurs slender; basal joints of the posterior tarsi equal in length to the next two. Length, 13.5 mm.; width, 5 mm. 1 ♂, 1 ♀.

Austin, Tex., 10/20. Collection C. W. Leng.

The structural characters of this species place it in the group given the generic name *Anisotarsus* by Chaudoir. It is distinguishable from *A. brevicollis* Chaud. by its much larger head, impunctate thorax and shorter and more strongly striate elytra. It closely resembles the larger species of the *fraternus* group of the genus *Harpalus*.

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## EDWARD DOUBLEDAY HARRIS.

BY CHARLES W. LENG,

STATEN ISLAND, N. Y.

Edward Doubleday Harris was born September 20, 1839, in Cambridge, Mass., the son of Dr. Thaddeus W. Harris, the author of "Insects Injurious to Vegetation," and a descendant of the English people who first settled in New England. He died of pneumonia, without pain, on Sunday afternoon, March 2, 1919, having attained a greater age than any of his forefathers, "the Patriarch of the Harris family," as he described himself a short time ago.

He was a man of many activities. By profession an architect, after studying in the Massachusetts School of Architecture, he came to New York in 1872 and became associated with A. T. Stewart in the building of St. Paul's School, St. Mary's School and St. Mary's Cathedral at Garden City and in the remodelling of the Grand Union and Windsor Hotels at Saratoga, and later in the rebuilding and management of the Stewart building at No. 280 Broadway, New York, where he had his own office. Among his other important architectural works were Woodlawn, Judge Hilton's 1,600-acre estate at Saratoga, and the Park Avenue Hotel in New York, at first called the Woman's Hotel. He was so successful in these important matters that he became later one of the executors of the Stewart Estate and afterwards of the Hilton Estate. Outside of these duties, which brought him a sufficient income, he devoted himself to church matters, being warden of St. John's Protestant Episcopal Church in Yonkers

(where he made his home at 224 Palisades Ave., for thirty-five years) and frequently its delegate to the diocesan convention; to genealogical and historical research, in which he was the author of many books and papers; and to entomology. He was the senior member of the Massachusetts Historical Society during the last year of



Mr. Harris and Mr. Leng, at Callicoon, Sullivan Co., N. Y., where *Cicindela marginipennis* is found on the stones in the foreground.

his life, having outlived all who were already members when he was elected; a member of the New England Historical Society, New York Genealogical and Biographical Society,<sup>1</sup> the American Museum of Natural History and the New York Entomological Society. In entomology he became a specialist in the family Cicindelidæ and gathered during the last twenty years of his life a collection phenomenal for its extraordinary number of specimens as well as species and for the extreme neatness and accuracy with which each specimen was prepared and labeled. This collection, which included exotic as well as

<sup>1</sup> A portrait and biography was published in the July number of this society's "Record" (Vol. L, No. 3, pp. 209-211).



*Sp. by Edw. D. Harris*



American species, he gave to the Museum of Comparative Zoölogy at Cambridge, possibly out of regard for his lifelong friend, Samuel Henshaw, its curator, carrying many of the boxes there himself before his death; the American Museum of Natural History was also indebted to him for many important donations. He was elected a member of the New York Entomological Society, October 20, 1903, and was its Vice-President at the time of his death. Notwithstanding his age, he was a frequent attendant at the meetings, his last appearance being on February 18, 1919; and often a contributor to its proceedings. At the meeting of November 5, 1918, he spoke at length of the Cicindelidæ of New Hampshire and especially of his success in personally tracing the distribution of *Cicindela ancocisconensis*, described by his father in 1852, on the watershed of the three rivers draining the White Mountains. His personal collecting covered many localities in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Long Island, New York, New Jersey, Delaware, Virginia, North Carolina, South Carolina and Tennessee by numerous short trips, the last having been Southern Pines, N. C., in February, 1919. At various times among his companions on such trips were Wm. T. Davis, A. J. Mutchler, A. H. Manee, Dr. F. E. Lutz and the writer.

All his entomological work was done after his sixtieth year; it will long be remembered, not only for that reason, itself sufficiently remarkable, but for the light it threw upon the geographical distribution and racial variations of the Cicindelidæ. He had just completed, when taken ill, an exhaustive study of the African Cicindelidæ collected for the American Museum of Natural History by Herbert Lang and James P. Chapin, the results of which may also be printed.

Mr. Harris was blessed by nature with great vitality and keen intellect; an unusually prepossessing appearance coupled with a personal charm of manner that drew his friends close to him; an uprightness that knew no deviation from the straight path, yet so tempered by tact and kindness that it never permitted him to wound the most sensitive; and a sense of humor that continually came to the surface and dimpled his cheeks. His long life was made heavy at times by the many responsibilities he assumed, but happily cheered by the wife, son and daughter who survive him, and by the host of friends who respected, admired and really loved him.

## ENTOMOLOGICAL WRITINGS OF EDWARD DOUBLEDAY HARRIS.

1. Description of *Cicindela roguensis*, Can. Ent., XXXIII, 1901, p. 226.
2. North American Cicindelidæ in the Harris Collection, Yonkers, 1911.
3. Three New Cicindelids, Journ. N. Y. Ent. Soc., XXI, 1913, pp. 67-69.
4. The Cicindelinae of North America as arranged by Dr. W. Horn, in Genera Insectorum, New York, 1916 (with C. W. Leng); distributed by Am. Mus. Nat. Hist.
- Short Notes and Remarks reported in Proc. N. Y. Ent. Soc.*
5. Some Cicindelidæ recently received from British Columbia, XIII, 1904, p. 25.
6. Report on Collecting in Del., W. Va., Vt., N. Y. and L. I., XIII, 1905, p. 100.
7. *Cicindela longilabris*, XIII, 1905, p. 168.
8. Collecting in Tenn., N. C., XVI, 1908, p. 55.
9. *Cic. formosa-generosa*, XVII, 1908, p. 47.
10. Cic. of So. Ala. received from Loding, XVIII, 1910, p. 131.
11. Habitat of Tiger Beetles, XXI, 1913, pp. 80-85.
12. Color forms of *C. rugifrons*, XXI, 1913, p. 164.
13. *C. longilabris* in N. Mex., XXI, 1913, p. 311.
14. *C. marginipennis* at Callicoon, N. Y., XXI, 1913, p. 318.
15. Recently Noted Forms of *Omus*, XXII, 1914, p. 78.
16. Letters of T. W. Harris, Haldeman, Melsheimer and Abbot, XXII, 1914, p. 76.
17. West Indian Cicindelidæ, XXII, 1914, p. 182.
18. Exhibition of Exotic Genera of Cic., XXII, 1914, pp. 82-183.
19. Collecting in Va., N. C., and S. C., XXIII, 1915, p. 198.
20. Collecting in L. I., XXIV, 1916, p. 101.
21. Anonymous Verse, XXIV, 1916, p. 159.
22. *C. ancocisconensis*, XXIV, 1916, p. 34.
23. Some White Mt. Cicindelæ, XXV, 1917, p. 137.
24. Cicindelidæ of New Hampshire, XXVI, 1918, p. 237.

## LIST OF SPECIES AND VARIETIES DESCRIBED.

- C. lantzi*, 13, p. 68, var. of *10-notata* Say.  
*C. vulgaris-minor*, 11, p. 18 = *minor* Leng.  
*C. borealis*, 11, p. 19 var. of *tranquebarica* Hbst.  
*C. roguensis*, 01, p. 226, = *vibex* Horn.  
*C. carolina*, 11, p. 28 var. of *scutellaris* Say.  
*C. segnis*, 13, p. 69, var. of *debilis* Bates.  
*C. smythi*, 13, p. 67, var. of *chlorocephala* Chev.  
*C. rubicunda*, 11, p. 55, var. of *sperata* Lec.



## MISCELLANEOUS NOTES.

Charles W. Leng, Secretary of the New York Entomological Society and Research Associate in the American Museum of Natural History, has been appointed Director of the Museum of the Staten Island Institute of Arts and Sciences. Mr. Leng has been interested in the natural history of Staten Island, where he was born and lives, since boyhood. Entomologists and other naturalists, visiting New York City, can reach the Museum of the Institute by a pleasant half hour's sail across the bay on the Staten Island ferry and thus inspect the collections in all orders that have been accumulated.

Edmund H. Gibson has resigned his position with the U. S. Bureau of Entomology and is entering upon a new field of endeavor for himself. Believing that entomology can be put on a dignified professional business basis the same as law, medicine, engineering, etc., he is taking the initial step and believes that after a certain amount of pioneering work the field should open up to other entomologists. Mr. Gibson's headquarters, for the time being, will be Alexandria, Virginia. His professional card is worded "Consulting Entomologist and Agricultural Engineer."

**Additions and Corrections to the Review of the Genus *Buprestis* in North America.**—*Buprestis viridisuturalis* Nicolay and Weiss (JOUR. N. Y. ENT. SOC., Vol. XXVI, p. 101). Mr. H. E. Burke informs us that this species breeds in cottonwood and Mr. Ralph Hopping also informs us that in addition to cottonwood, he has found it breeding in alder, and that it occurs at less than 1,000 feet elevation and at 4,500 feet in such interior valleys as the Yosemite of the South Fork of Kings River.

***Buprestis connexa*** Horn. The record of this species from Gainesville, Florida (Ent. News, 1918, Vol. XXIX, p. 331) is an error. This very rare species is confined to the North Western United States (Oregon, California, Nevada, Idaho).

***Buprestis fasciata*** Fabricius. In the key to the species of *Buprestis* (JOUR. N. Y. ENT. SOC., Vol. XXVI, p. 81, second line from top), the word "usually" should precede "internally" and "armed" in order to admit this species and its variety *langi* Mann.—A. S. NICOLAY AND H. B. WEISS.

## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

## MEETING OF FEBRUARY 18.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., February 18, 1919, in the American Museum of Natural History, President L. B. Woodruff in the chair, with 18 members and two visitors present.

The following active members were elected; Lt. Willard J. Chamberlin, Oregon Exp. Sta., Corvallis, Oregon; Morton R. Peck, M.D., Cornwall-on-the-Hudson, N. Y.; J. W. Smith, 212 Madison Ave., Paterson, N. J.; Waldo Kortright, 123 May St., Hawthorne, N. J.

Dr. Lutz exhibited *Memoirs III*, N. S., Am. Mus. N. H., Oct., 1918, containing "Illustrations of the N. Am. Sp. of the gen. *Catocala*" with extraordinary profusion of colored plates, possibly the most sumptuous volume of American entomology published.

A photograph of Dr. A. Fenyés, of Pasadena, was received. Papers on the legs of insects were read by Mr. Barber (Hemiptera), Dr. Lutz (honey bee), Mr. Schott (*Calotarsa* ♂), Dr. Felt (Gall Midges), and were freely discussed by the members; Mr. Sturtevant, present as a visitor, referring especially to the mutations observed in legs of *Drosophila*, Dr. Lutz to the so-called "sex combs," and Dr. Bequaert to the paucity of interesting adaptations in legs of Diptera as compared with those of Hymenoptera, excepting always the pulvillus on the foot of the fly, of which he spoke at some length.

Lt. Chamberlin described the conditions under which his work in the Air Service had been performed in France and of his few opportunities for collecting there and in Italy.

## MEETING OF MARCH 4.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., in the American Museum of Natural History on March 4, 1919, President L. B. Woodruff in the chair, with 19 members present.

Mr. Davis presented \$100.00 to the Society, which at his suggestion was on motion of Mr. Sherman added to the Permanent Fund.

The donation was greeted by applause and a formal vote of thanks to Mr. Davis.

Mr. Leng announced the death on March 2, in his eightieth year, of Edward Doubleday Harris, Vice-President of the Society, and moved that a minute be hereby entered expressing the regret of the Society and that a suitable obituary notice be printed in the JOURNAL,—carried.

Mr. Davis showed a male and female cicada, *Tibicen bermudina* Verrill, from the Bermuda Islands and our native *Tibicen lyriceus* DeGeer. These two species closely resemble each other, though distinct, and *bermudina* is prob-

ably the result of a stray *lyricen* having reached the Island at some remote period. He further stated that in *Tibicen biconica* we had a species found in Cuba, the Bahama Islands and southern Florida. He also showed a male cotype of *Okanagana arctostaphyla* Van D., a male and female *Okanagana rubrovenosa* and a pair of *Okanagana mariposa* from Lake Co., California, collected by Dr. F. E. Blaisdell. But two specimens of this last species had heretofore been examined, both from Mariposa Co., Calif.

Mr. Davis also exhibited *Stagmomantis floridanis* and called attention to errors in the title printed beneath the plate figures in the Brooklyn Bulletin.

Mr. Notman read a paper, "Records and New Species of Carabidæ," which will be printed in the JOURNAL.

Mr. Gaudin exhibited a large number of insects that he had collected in California in 1918. He read an account from the *Greensboro Daily News* of his experiences in North Carolina on his journey westward which is printed in Miscellaneous Notes. Among the many interesting insects shown were two specimens of *Ulochates leoninus* found on a pine in California, beneath the bark of which were the fragments of many more, and a small Monarch butterfly, captured locally, spreading only 68 mm.

Dr. Felt spoke briefly in regard to the European corn borer, *Pyrausta nubilalis* Hübn., calling attention to its discovery in this State the very last of January of this year with a restriction to an area of approximately 400 square miles. He mentioned the rearing of the insect in Massachusetts in 1916, its identification in 1917, and described the very serious injuries caused in 1918, giving special attention to the national phases and emphasizing the desirability of exterminating the pest if possible before it gets beyond control. He also called attention to the great difficulty of distinguishing between the larva of this pest and those of certain native stalk-boring *Pyraustids*.

Mr. Mutchler exhibited two drawers of Arizona beetles donated to the American Museum of Natural History by Mr. Davis. These were part of those collected some years ago by Dr. R. E. Kunze and sent by him to the late Charles Palm; they later passed into the keeping of Louis H. Joutel, who sold them for Dr. Kunze to Mr. Davis unmounted. Many of them have since been mounted and labelled by Mr. Shoemaker and are thus finally becoming available for study.

Mr. Mutchler also exhibited *Euryscelis suturalis*, found by Mr. Davis, April 10, 1912, at Everglade, Florida, and remarked upon its established West Indian distribution, including Andros Island, Bahamas (W. M. Mann), and the certainty that the New York record was based upon a specimen accidentally introduced in timber.

#### MEETING OF MARCH 18.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., on March 18, 1919, in the American Museum of Natural History. Mr. Wm. T. Davis, chairman pro tem., with sixteen members and three visitors present.

Mr. John D. Sherman, Jr., was elected Vice-President in place of Mr. Edw. D. Harris, deceased.

Mr. Sherman exhibited and commented on "Some Unusual Entomological Pamphlets" including an early copy of the *Oölogist*, an early paper by Theodore Roosevelt, circulars (old series) of Dept. of Agriculture, 1884 to 1886, the Entomologists' Exchange of 1879, Belfrage price list from *Psyche* Advertiser, Lists published in 1873 by Dimmock, Sherman's lists of 1899 and earlier; Howard's S. C. List of 1883; Dr. Horn's Reply to C. V. Riley; Jaeger's 1853 List of N. Am. Insects; Panzer's reprint dated 1790 of Isaac Uddman's *Novae Ins. Sp.* first printed in 1753, one of Thunberg's *Diss. Novas. Ins. Sp.* dated 1781; Provancher's Additions and Corrections 1877-1879, the Willoughby Society's reprint of John R. Forster's first descriptions in 1771 and Townend Glover's cotton insects of which only 60 copies were printed. In reference to Leconte and Casey, Mr. Sherman said that of some of the papers by each author, no extras were ever printed, *e.g.*, Leconte's *Nomenclature*, Vancouver and Lake Superior papers and Casey's papers in *Ent. News* and *Can. Ent.*, making them hard to obtain.

In the discussion that followed Mr. Davis said that Jaeger's book was perhaps responsible for the statement, since often repeated, that some species of Cicada spent only two years underground, which he believed to be erroneous. Mr. Davis also mentioned that according to Dr. Schwarz the plates used in Glover's works were still in existence stored away in the Smithsonian Institute.

Mr. Leng exhibited for Mr. Bell specimens of *Sphenophorus pertinax*, with the basal part of the cattails in which they were found, cut open to show the chambers excavated by the larva; and read a letter from Mr. Bell giving further details. It was especially interesting to note that while the larvæ of the noctuid *Sphida obliqua* were also found in the cattail stalks it was always in a different part thereof. The excavation of these stalks by *Sphenophorus pertinax* larvæ has already been noticed in *Bull. No. 79, Univ. Ill. Agl. Exp. Sta.*, 1902, p. 452.

Mr. Leng also read a paper on the "Sequence of Coleopterous Families" which will be printed elsewhere.

Dr. Harry H. Knight, present as a visitor, spoke of the Cornell Transcontinental Auto. Exp. and described especially their experiences in light collecting in the Arizona desert. A pyramid about three feet square at base and four feet high, made of cheese cloth, was used with a Prestolite tank and acetylene burner to supply light, the burner being inside the pyramid. The light was conspicuous a mile away and attracted great quantities of insects of all orders. Beetles were so numerous that it was necessary to remove them to have room for other orders on the cloth.

Dr. Lutz spoke of the advantages of the A tent he had used in Arizona, especially in its greater surface and portability.

Mr. Davis exhibited a living specimen of *Calosoma scrutator* found hibernating on Staten Island about an inch below the ground surface by a Mr. Franklin; also specimens taken in the Catskill Mountains of *Necrophilus*

*pettiti*, three specimens of *Cychnus*, *Brathinus nitidus*, *Cicindela ancociscenensis* and other Coleoptera, commenting upon the beetles collected there at sugar and in traps.

Mr. Notman said that he also had found *Cychnus* in traps in the Adirondacks, the species being *brevoorti*, at an elevation of 3,000 feet.

Mr. Mutchler exhibited, for Mr. Weiss, the larva of the European corn-borer, *Pyrausta nubilalis*, and a photo of the placard issued in reference thereto by the Agricultural Department.

Mr. Burns exhibited *Platychnus* entangled in red top grass (*Agrostis alba*) found by him at Watchogue, Staten Island, July 28.

#### MEETING OF APRIL 1.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., April 1, 1919, in the American Museum of Natural History, with the Vice-President John D. Sherman, Jr., in the chair, and 26 members and three visitors present.

Dr. Bequaert, for the Field Committee, reported postponement of April 6 excursion to Flushing, until April 20, on account of late season.

Mr. Schaeffer, under the title "Remarks on the Clerid genus *Aulicus* Spin.," exhibited his collection and said that the single species in the Henshaw Check List, viz.: *A. nero* Spinola was described from Mexico and probably did not occur in the United States. Another Mexican species, *A. monticola*, has been taken in Alpine, Texas, by Prof. Wickham. *A. femoralis*, from Nogales, Ariz., since described, as well as several other undescribed species, have been confused with *nero*. As in *Cicindela*, there is much variation in the maculation which probably caused Dr. Horn, and others, to refer the different forms to *A. nero*. Specimens from New Mexico, Arizona, Texas, Nevada and Mexico had been obtained from various sources and none agreed with the description of *nero*. Mr. Schaeffer described the differences he had noted in the antennal club, which should be abruptly clubbed to agree with generic characters of *Aulicus*, but is in a few species actually dilated from the sixth or seventh joint; and in the claws which should be simple, but are more or less toothed in certain males, so that it became difficult to decide whether they should all be referred to *Aulicus* or new genera erected on characters possessed by the males only. Mr. Schaeffer reserved decision pending examination of more specimens.

Mr. Davis read "Collecting Notes from Gardiner's Island" and exhibited five boxes of specimens, many photographs, maps, etc., to illustrate his account of the locality. This island lies east of Long Island, N. Y., is about  $5 \times 3$  miles, and contains two very old forests, a large pond, beaches, sand dunes, marsh, all preserved from desecration by thirteen generations of continuous ownership in one family. The following interesting insects were observed; 39 species of Orthoptera, among them *Amblycorypha floridana carinata* R. & H., which has never before been reported from the State of New York;

*Pseudopomala brachyptera* was also collected. The tiger beetles seen were *Cicindela hirticollis*, *purpurea*, *repanda*, *marginata*, *punctulata*, *sexguttata* and *tranquebarica*; other beetles included *Sphæridium scarabæoides*, *Helluomorpha bicolor*, *Nematodes penetrans*; butterflies and *Polistes* were rather scarce, but twenty-seven species of trees were listed.

Dr. J. Bequaert exhibited about 150 species of Hymenoptera and 50 species of Diptera collected on Gardiner's Island during his stay with Mr. Davis from August 17 to August 23 of last year. Mr. Davis's collecting of 1911 included several additional forms. A specimen of *Zethus spinipes* Say was taken by Mr. Davis on a previous visit to the Island. Other interesting species were among the Hymenoptera: *Methoca stygia* Say, *Philanthus politus* Say, *Psen chalcifrons* Packard, *Crabro provancheri* Fox, *Trypoxylon politum* Say, *T. tridentatum* Packard, *Nysson plagiatus* Cresson; *Epcolus lectoides* Robertson, *E. vernoniae* Cockerell, *Bombus separatus* Cresson, *B. pennsylvanicus* De Geer, *B. impatiens*, Cresson, *B. vagans* Smith; *Vespa maculata* Fabricius, *V. communis* de Saussure. Among the Diptera: *Spogostylum simson* Fabricius, *S. paper* Loew, *Anthrax tegminipennis* Say, *A. lateralis* Say, *Exoprosopa fascipennis* Say; *Tabanus nigrovittatus* Macquart, *Chrysops flavidus* Wiedemann, *C. vittatus* Wiedemann, *C. callidus* Osten Sacken.

#### MEETING OF APRIL 16.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., in the American Museum of Natural History, April 15, 1919, Mr. Harry G. Barber in the chair, with 15 members and four visitors present.

Lt. W. J. Chamberlin, under the title "Collecting in the Blue Mountains of Oregon," gave an account of his work in 1914 in four different regions in Oregon, especially referring to forest insects, Buprestidæ, Cerambycidæ and Scolytidæ. First eight days were spent in the Florence region in Siuslaw Nat. Forest on the Pacific coast to determine the extent of damage done by the fire of 1866, which as far as insects were concerned, was found not to exceed 15 per cent. over ordinary mill loss, being chiefly done by Cerambycidæ working in the sapwood. Little incidental collecting could be done on account of heavy rain, but one new Scolytid was found. The rainfall averages 80 inches in this region, which is very rough country, broken by many ranges of the Coast Mountains, but of only 500 feet elevation and mild temperature, snow being almost unknown. Douglas fir is the typical tree, though Western Hemlock is quite common on the lower slopes and heavy underbrush is characteristic.

Next six weeks were spent in the Sumpter region, in the Blue Mountains of eastern Oregon, in the Whitman Nat. Forest. The altitudes range from 4,500 to 7,000 feet, rainfall is only 25 inches, but 6 feet of snow in winter and hard frost as late as June to indicate the greater severity of the climate. There is a large variety of trees with Lodgepole Pine predominant and insects are abundant, doing little damage to healthy trees, because there is plenty of dead timber, due to wind, etc., in which they work.

*Dendroctonus monticola*, *valens*, *Ips emarginatus*, *Tetropium velutinum*, were among the most important species.

Ten days were next spent in the Sparta region, also in the Blue Mountains, but nearer the eastern border of Oregon and in Minan National Forest. The country there is more open, with mountain parks and meadows. The Yellow Pine is predominant, but the meadow flowers attract many pollen feeders and make interesting collecting.

It was here that *Buprestis connexa* was found on yellow pine logs and *Melasis rufipennis* in a Grand Fir overthrown by the wind, from weakness caused by its attacks, which had penetrated to the center of its 18-inch trunk.

The fourth region visited was Detroit, in Marion County, and in the Cascade Mountains, mostly in the Santiam National Forest. The number of tree species found was greater than elsewhere. Douglas fir was again dominant, but Alaska and other cedars are not uncommon; pines, hemlocks, firs, juniper and yew also occur. The Cerambycid *Atimia dorsalis* was found in abundance on Alaska cedar, August 20, *Criocephalus productus* on Noble Fir, and many Buprestids and Scolytids, including new species since described by Swaine, Van Dyke and Lt. Chamberlin.

In reply to Mr. Dickerson, Lt. Chamberlin described the outfit he carried during his three months' exploration of these forests and explained that his collecting was done with his fingers and his axe.

Mr. Bird read a review of "Insects Injurious to Hop in New York" (Memoir No. 15, Cornell Univ. Agl. Exp. Sta.), which will be printed in full.

Mr. Bird also presented a *Cuterebra* fly, taken at Rye, N. Y., to the Local Collection.

Mr. Shoemaker recorded the capture of the Coccinellid *Adalia humeralis* Say on April 13, 1919, on a rosebush at 6916 17th Ave., Brooklyn, exhibiting a colored drawing thereof. In addition to the usual humeral and subsutural red spots, this specimen has the apex of each elytron red.

Mr. Burns exhibited the powder post beetle *Lyctus planicollis*, working in ash and called attention to the exceeding softness of the powder, which he said was used in some European countries for toilet purposes.

Mr. Davis exhibited the Proc. Ent. Soc. Br. Col., a new periodical.

#### MEETING OF MAY 6.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., May 6, 1919, in the American Museum of Natural History, Mr. Harry G. Barber in the chair, with 13 members and two visitors present.

Dr. Bequaert, for the Field Committee, reported on the excursion to Flushing, L. I., on April 20; and on one for Decoration Day to Great Piece Meadow, N. J.

Dr. A. H. Sturtevant, of Columbia University, was proposed for membership by Mr. Mutchler, and, the by-laws having been suspended for the purpose, was immediately elected.

Mr. Notman exhibited 301 species "Coleoptera collected at Schoharie.

N. Y.," of which nine were undescribed or heretofore unrecorded from America, as well as many insects of other orders.

Mr. Mutchler spoke of "Genitalia of *Polyphylla*," exhibiting more than 50 dissected specimens and drawings of their genitalia by Mr. Olsen. He said the work started with an effort to identify the numerous specimens collected in Arizona and California by Dr. Lutz and Dr. Bequaert and with hopes that differences in genitalia would support the rather feeble superficial characters by which the species described since Leconte's time are differentiated. Thus far the result was not favorable to the retention of many names.

Mr. Burns exhibited *Tropea luna* var. *rubromarginata* Davis caught at Arrochar, Staten Island, May 2, 1919.

Mr. Davis said that *Papilio turnus* was seen near Oakwood, Staten Island, on April 22, 1919, while in company with Mr. Edw. J. Burns. The first record of 1918 was April 24, Palisade, N. J., mentioned in the minutes, XXVI, p. 232.

Mr. Gaudin said that he had seen a specimen even earlier; on April 19.

Mr. Davis exhibited *Pselliopsis barberi*, a hemipteron of which Dr. H. H. Knight had taken 76 at Springfield, Mo., on trunks of sycamore, and an allied species, pointing out the differences and early date of appearance and mating.

Mr. Davis also exhibited Orthoptera from Philippine Islands, received through the kindness of Professor Funkhouser.



# THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

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The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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### DELEGATE TO THE N. Y. ACADEMY OF SCIENCES

WILLIAM T. DAVIS.

# JOURNAL

OF THE

## New York Entomological Society.

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# JOURNAL

OF THE

## New York Entomological Society.

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### A REVIEW OF OUR LOCAL SPECIES OF THE MEMBRACID GENUS OPHIDERMA FAIRM. (HEMIP.-HOMOP.).

BY LEWIS B. WOODRUFF,

NEW YORK, N. Y.

Notwithstanding the study which has been given to the Membracidae, a study favored in large part by the attraction and interest which is aroused by the grotesque forms of so many of its members—bizarre is the descriptive term commonly and appropriately applied to them—much confusion persists in respect to the generic and specific limitations of its components. Species have been transferred back and forth from one genus to another, new genera erected, only to be reduced, and many descriptions and figures published which, because of insufficient detail and faulty delineation, or quite possibly through lack of rediscovery, have thus far eluded identification. One of the occasions for this confusion lies in the fact that often great variability prevails within the limits of a single species both as to color and form, giving rise to the description and naming of many reputed species which on further study, and accumulation of greater material, have to be sunk into synonymy. Quite possibly, too, hybridization may be common, with resulting varieties which must add to the perplexities confronting the taxonomist. For these reasons among others such papers dealing with the subject as have been pub-

lished have, for the most part, been put forth tentatively as "preliminary" studies, or under similar designations.

In habit the several species are generally more or less gregarious; and while many undoubted species seem to have a wide distribution across the continent, others appear to be extremely local in their habitat. Besides it is believed that the individuals of a colony, although good fliers, seldom stray far from their particular host plant; so that such a colony of a single species persisting through many generations might easily give rise to a local race which, while its individuals may readily be separated from the typical form by some recognizable feature, still presents no structural or other character which would warrant specific separation. Such a race, for instance, appears to be found in *Atymna querci* Fitch, where in a comparatively long series taken by me in Orange County, N. Y., the black of the typical male of that species is replaced by a reddish pink. Similar instances of racial forms will be called to mind in the other orders of insects. But where insects taken in the same general locality and environment, but from different food plants, present differing characters which, however slight, are constant with respect to their particular host, the recognition of such differences as entitling their possessors to be regarded as specifically distinct seems to be warranted.

The foregoing considerations find their application in *Ophiderma* Fairmaire, an exclusively North American genus of comparatively few species, yet presenting the confusion so prevalent in the family. Excluding *Ophiderma mus* Champion, a Central American species whose proper assignation to this genus has met with question, there remain seven species which are listed in VanDuzee's Check List of Hemiptera; and since its publication two others have been described, making a total of nine for the genus, of which six are from the eastern United States. Of these six one may prove to be the male of another, thus cutting our local list to five; to which, however, two other well-characterized and hitherto undescribed species should be added, as well as a form entitled to at least varietal recognition.

The species on which the genus is founded is *Ophiderma salamandra* Fairmaire, the largest in the genus. *Salamandra* is found in the adult stage near New York City from the second week in June till the second week in August, and in my experience almost exclu-

sively on *Quercus rubra*. It is a dull olive and red-brown species, rather less hairy and with the characteristic color pattern more clearly defined in the female than is found in that sex in the closely allied species *O. pubescens* Emmons, with which it is often confounded. The latter is commonly taken in this neighborhood during the same period as the former, but usually on *Quercus velutina*. The obscure, often obsolete, color pattern of the females, the denser pubescence, and much smaller size, readily distinguish *pubescens* from *salamandra*. The males of both species differ from the females in being slightly smaller, darker, more shining, and more distinctly arcuated with a pale vitta from the humerus back to the mid-lateral margin of the pronotum. These two species offer no real difficulties, although it is significant of the variability of the color markings that Mr. VanDuzee refers to *salamandra* as the duller of the two, whereas in my experience it is the brighter, at least in the female sex.

In this connection, however, it seems worth noting that in Florida, and at least as far north as south-central North Carolina, typical *pubescens* is replaced by a form somewhat smaller and more slender and in which the ground color is light green more or less suffused with pinkish, instead of the usual sordid dull olive brown, and the space between the mid-dorsal and apical vittæ is a bright pinkish red. This form I would designate as *O. pubescens* var. *australis*, n. var., with type female and allotype male from Southern Pines, N. C., taken in May (A. H. Manee), the former in collection of Chris E. Olsen of this city, the latter in my own. Paratypes are in the above collections and in that of Mrs. Slosson, those of the latter having been taken at Jacksonville, Fla.

The next species to be considered is *O. flaviguttula* Goding. In most collections to which I have had access I find it unrecognized. Nor is it treated in the literature other than by way of listing since Dr. Goding described it in 1894; with one notable exception. In a paper published in the December, 1917, number of this JOURNAL entitled "The Genus Ophiderma Fairm." by Gibson and Wells, the species is included in a key, and in the same paper is again referred to in a descriptive and distributional note. Dr. Goding's description was based on a single female taken in Illinois; and in view of the unavailability of his collection containing his types, and the fact that the description closely corresponds to many specimens of *pubescens*, com-

bined with the apparent absence of other specimens in collectors' cabinets separable from known species and recognizable under that description, the suspicion has prevailed that *flaviguttula* might have to be regarded as a synonym. An inspection of the material in the National Museum at Washington on which Gibson and Wells' paper was based, discloses a considerable number of specimens placed over the name label *O. flaviguttula* Goding, three of which, all females, appear to be substantially identical, and to agree very closely with Goding's description of that species. One, shown by the Museum records to have been taken in Central Missouri by Riley and bearing locality label "C. Mo.," bears a pin label in what is believed to be Dr. Ashmead's handwriting designating it as *O. flaviguttula* God'g., and on the lower left-hand margin appears the abbreviation "Godg detn," which would seem to be interpretable as "Goding's determination." The other two bear locality labels "Md. R. R. Uhler Collection," and "Mass." respectively. In my own collection there is a specimen, also a female, which appears to be identical in species with them, taken by me at Bronxville, N. Y., July 4, 1911. There is no other described *Ophiderma* to which they can be assigned; and the above script makes it fairly certain that this species should be recognized under Dr. Goding's designation, and that the name should not be sunk into synonymy as has been suggested.

For the convenience of students to whom the original description (published in Vol. III of Bulletin Illinois State Laboratory of Natural History) may be inaccessible, I herewith transcribe it, as well as a characterization of my Bronxville specimen above referred to:

**"*O. flaviguttula* n. sp.**

*"Female.*—Head triangular, yellowish; eyes prominent, dark brown; ocelli equidistant from each other and the eyes, red; convex, densely pubescent. Prothorax with very slight median carina, densely pubescent, an irregular yellow patch starting at lateral border and extending upwards and forwards, midway between base and apex; an irregular band at base, concolorous with head, extending along sides in a greenish gray line; otherwise dirty brown, lightly punctured; apex of posterior process not reaching apex of tegmina. Tegmina sub-coriaceous at base, lightly punctured, basal half and apex brown. Below yellow, feet and legs brown. Length 6.2 mm.

"Described from one specimen from Illinois (Stromberg). Type in author's collection."



**O. flaviguttula** Godg.

*Female*.—Very slender; not coarsely punctured, *sparsely* pubescent. Face yellow, punctures dark; clypeus rounded, extending below marginal line of cheeks; clypeal sutures, inner margins of eyes, ocelli, spots at base of vertex over ocelli, and callosities of pronotum, red. Median carina of pronotum black, interrupted by mid-dorsal white spot. Pronotum not reaching apex of elytra, testaceous, pattern obscurely indicated. Obsolete parallel reddish bands extending from pronotal callosities straight back over humeri. White vittæ rising from mid-lateral pronotal margin to junction with mid-dorsal transverse white spot, narrowly bordered posteriorly with dark reddish; apical fourth with obsolete sub-apical transverse white vitta bordered obscurely with blackish. Dark border of pronotal mid-lateral white vitta continued in band across elytron, broadly whitish before it; base and apex of elytra dark, otherwise hyaline. Beneath pale; femora above, tibiæ in front, black. Length  $5\frac{1}{2}$  mm.

Described from specimen in author's collection, taken by him at Bronxville, Westchester County, N. Y., July 4, 1911, on hickory.

It will be noted that aside from differences in color or shade the above two descriptions present two other conspicuously inconsistent characters, *i.e.*, Dr. Goding describes his specimen as *densely* pubescent (thereby suggesting *pubescens*) instead of *sparsely* pubescent; and, although describing the elytra, makes no reference to the mid-elytral dark band, so notable in the Bronxville specimen. However, both in respect to degree of pubescence and the presence of the elytral band, an actual comparison of the latter specimen with that in the National Museum supposed to have been determined by Dr. Goding as his *flaviguttula* discloses no appreciable difference between them.

In addition to the above four specimens a comparatively large series has been studied by me which by reason of depth of color and sharp definition of pattern I have been disposed to regard as constituting still another species. These range from bright red to black in both sexes. Those in my collection I had provisionally designated as *O. definitiva* n. sp. But in view of their gradation in coloring toward the specimen in the National Museum bearing the record of Dr. Goding's determination above referred to (though none is quite so pale and obscurely patterned), their similarity in size, and apparent lack of other structural differential character, I hesitate to give them separate specific rank, and for the present would associate them as variety *definita* with what is here regarded as typical *flaviguttula*

Godg. This series, with representatives from Texas and Florida to New England and Canada, comprises both sexes; and, if properly assigned to that species, furnishes us with examples of the male, hitherto undescribed and unrecognized. That sex is slightly smaller than the female, and has the mid-lateral pale band broader and notably arcuate over the humeri after the usual male pattern in the genus. The presence throughout the series of the mid-elytral dark band is a constant character, though subject to some variability in definition. In this locality *Quercus rubra* is the favored host plant of this form. Type female, July 19, 1914, and allotype male, June 14, 1914, taken by me at Bronxville, N. Y., in author's collection. Paratypes in collections of U. S. Nat. Mus., Wm. T. Davis, E. P. VanDuzee and Mrs. Slosson.

There remains what seems to be another undescribed species, closely related to the above, represented in my collection by a series of twenty-seven specimens, all females, taken by me during the past two years. While loth on general principles to found a species on material presenting but one sex, the general facies of these specimens is so distinct from any heretofore described, in both color tone and structural outline, that I feel justified in offering the following specific designation based upon them. None of the several collections to which I have had access has revealed a specimen which can be allocated with them. It is hoped that further and earlier collecting in the type locality may discover the male sex, which I suspect appears early in the season and after mating survives but a short time.

**Ophiderma grisea** new species.

*Female*.—Type: Rather slender, slightly larger, broader across humeri and more hairy than *flaviguttula* Godg. or its varietal form *definita* (*supra*). Pronotum long, attaining apex of terminal areole, apex in lateral aspect sharply acute. Dorsal line in lateral aspect slightly elevated just back of humeri, succeeded posteriorly by a distinct sinus at mid-dorsal white spot; posteriorly gently arcuate to tip. (In series dorsal line tends to be straight.)

Face dull yellowish drab, clypeal sutures, dots on vertex above ocelli and pronotal callosities, black; ocelli red. Pronotum gray, with buffy admixture on anterior half, obsoletely banded arcuately over humeri with broad whitish vittæ. At mid-lateral pronotal margins broad white vittæ ascend to a junction with white spot at mid-dorsal line, bordered anteriorly (obscurely) and posteriorly (sharply and broadly) with blackish brown, *which is continued across elytra*, and becomes grayish toward pronotal apex; sub-apical transverse vitta

faintly indicated. Elytra whitish before the transverse black band, hyaline behind it, apex with small sharply defined black cloud (larger than in *flaviguttula*) covering apical areole and apical half of cell above it. Body beneath pale; legs pale, femora above and tibiae anteriorly black. Length 6 mm.

Type in my collection. Taken by me at Litchfield, Conn., July 19, 1918, on *Quercus coccinea*. A series of twenty-six other specimens, all females, taken at the same place between July 8 and August 11, mostly on same species of oak, but a few on neighboring *Quercus rubra*. Paratypes will be placed in the National Museum at Washington and in the American Museum of Natural History at New York City.

This species is close to *flaviguttula* Godg., belonging to the group with banded elytra, but differs conspicuously in its more robust structure, greater average length, more slender and sharper pronotal apex, and in particular in the blue-gray shades lacking reddish admixture, the insect being markedly gray, black and white instead of brownish.

*O. flavicephala* Godg. is a pretty little red-brown species which is easily recognizable by the broad cream-colored marginal or submarginal vitta, and the extremely dense and long pubescence of the entire pronotum. Confusion is not apt to be encountered here, although in some instances I have found males of two other species associated with it in collections.

Coming now to *O. flava* Godg., we seem to have two definitely distinguishable species standing together in our cabinets, and all females. One of these is undoubtedly new, but before describing it, it becomes necessary to determine to which of the two Dr. Goding's description properly applies. Unfortunately the "types" of his species are not now available, which requires us to rely wholly upon the description itself, and here we meet with our first difficulty. The insect is described as yellow, or in a fresh specimen, green. The females of the two species now under examination are both green! Next, *flava* is said to be similar in stature to *salamandra*, "but much broader between lateral angles." Neither of our green species is broader, and at first blush we are in trouble; but an examination of Dr. Goding's paper shows that he confused *salamandra* and *pubescens*, regarding Emmons' name as a synonym of the former,—and one of our green species does agree with that characterization as applied to

*pubescens*, while the other does not. Then he states that the apex of the head is "strongly recurved." By this reference is doubtless made to the clypeus, which again agrees with but one of our green species. From the foregoing it would seem possible to determine to which of our very similar green female *Ophidermas* the name *flava* Godg. is applicable.

But still another difficulty is encountered, and that has to do with the male of this species. Female specimens seem to be present in almost all the collections to which I have succeeded in gaining access, but in none of them, nor of those with whose owners or custodians I have consulted, is a male specimen of *Ophiderma* assigned to *flava*. Dr. Goding in his original description of the species stated that it was based on "one male received from Mr. Westcott and one female from Dr. Riley," thus indicating that he found no difference between them other than in the genital organs; and all subsequent papers on the genus have perpetuated this inference. But as my collecting had likewise failed to discover a green male, and as in a closely allied species of which I had taken several examples of both sexes in association and at least two pairs *in copula*, a species I purpose to describe in this paper, the male is dissimilar in color from the female, which on its part corresponds in color and fairly well in other respects with that covered by Dr. Goding's description in question, I was led to write him asking that he again examine his "types" with respect to their sex. After very considerable delay I am now in receipt of a letter from him from Ecuador, in which he writes: "Westcott's example female, error due to mounting on a card which more or less covered genital organs." That confirms my suspicion that the male of *flava* has not yet been recognized. May it not be that in reliance upon the published description of the male and female as alike, our students and collectors, while finding the female of *flava* and correctly assigning it to that species, have failed to recognize a totally differently colored insect of the opposite sex as being of the same species? In my own collection I have long had a male *Ophiderma*, which did not accord with any published description, pinned above my rows of *flava* females. It was so placed because I more than suspected that the male *flava* was not green, because in size and structure it exhibited characters that would be looked for in the male of such an *Ophiderma* as is the female *flava*, because in color pattern

and markings it followed lines similar to those of the males of the allied species above referred to and hereinafter described, and because I had taken it from the same tree (presumably its food plant) from which I had taken females of what I believe to be the true *flava*. Other examples of such males have been noted in other collections, either unassigned or manifestly placed erroneously, though never under *flava*. Since this paper was first drafted there has appeared the review of the genus by Gibson and Wells above referred to, in the course of which the species *O. fraterna* is described as new, based upon three male specimens in the National Museum collection. No female which might plausibly be assigned to *fraterna* has yet been discovered so far as I can ascertain. A recent examination of the type material has confirmed by suspicion that the authors of that paper had before them what it is here suggested may prove to be the male of Goding's *O. flava*. But pending more positive evidence that it is the male of the latter, it may be advisable to retain for it the name *fraterna* Gibson and Wells.

It is now in order to describe the green *Ophiderma* which has been confused with the true *flava*, and which is represented by a considerable series of both sexes before me. Inasmuch as the females are most likely to be confounded with *flava*, I will select that sex for the type.

***Ophiderma evelyna* new species.**

*Female*.—Type: Slender, strongly hairy pubescent on face and pronotum. Face little broader than long; clypeus rounded, but little surpassing line of cheeks, the latter scarcely if at all sinuate. Pronotum long and slender apically. Elytral hook slender, distinctly upturned at apex. Face and pronotum wholly light green, the face paler. Elytra slightly infuscated at base and apex, nervures pale. Abdomen yellowish green above and beneath. Legs wholly yellowish green, claws dark brown. Length 6 mm.

*Male*.—Allotype: Smaller than female, slender; pubescence and structure as in that sex. Face yellowish green, immaculate; two minute dots at base of vertex above ocelli. Pronotum comparatively short, not extending more than half way between end of abdomen and apex of elytra; pronotal apex rather broad; color light reddish brown, darker posteriorly, anteriorly strongly washed with yellowish green, concolorous with face, callosities black; a broad arcuate vitta from humeral angle to mid-lateral margin, a mid-dorsal spot, and a sub-apical broad transverse vitta, yellow. Elytra hyaline, nervures brown, dark smoky at basal third, broadly so at apex. Abdomen black above, margins of

segments yellow; beneath, including legs, yellowish green, claws dark brown. Length  $5\frac{1}{2}$  mm.

Type and allotype in author's collection. Described from a pair taken by me *in copula* on *Quercus velutina* at Bronxville, Westchester County, N. Y., June 15, 1913. In addition to this pair I have before me a series of twelve males and fourteen females taken at the same place and on the same species of oak; also a female taken at Ithaca, N. Y., and two males, one from DuBois, Ill., and the other bearing the label "L. E. Lea, Agri. Col. Miss." These three become paratypes, and are returned to the collection of Mr. W. D. Funkhouser, who kindly lent them to me. Paratypes will also be placed in the collections of the National Museum, and of the American Museum of Natural History in New York.

This species averages distinctly smaller than *flava*, the females ranging from 6- $6\frac{1}{2}$  mm., and the males from  $5\frac{1}{2}$ -6 mm.; and in the female it is wholly pale green, whereas *flava* is apt to be more or less suffused with rosy, particularly on the apical half of the pronotum and beneath. The form of the hook at the base of the elytra in the specimens examined is much more acute and upturned than in *flava*, and, if reliance can be placed on a structure which is subject to such a degree of variability, may perhaps alone serve to distinguish the two species. The males, aside from size, are easily separable on color differences from *O. fraterna* Gibson and Wells, and from *O. pubescens* Emmons, which latter they more nearly resemble in size and color pattern, though conspicuously paler and less densely hairy. In my experience *flava* is almost always found on *Quercus rubra*, while *evelyna* is found on *Quercus velutina*.

The following key to the several species of the genus as understood by me, including those above described, has been drawn with those published by Mr. VanDuzee and by Gibson and Wells before me; to whom, as well as to all who have assisted me with material and helpful suggestions and advice, and in particular to Messrs. W. D. Funkhouser and Wm. T. Davis, I would acknowledge my indebtedness. It has been my aim in preparing the key to make use of such characters as are readily apparent, such as color, in spite of its variability, and to avoid the use of those which the inexpert might find difficulty in discerning, as for instance the degree of sinuation of facial outline; and it is believed that by its use the proper specific

assignment of any specimen of the genus in hand may readily be determined.

# KEY TO THE SPECIES.

- A. Terminal areole transverse, scarcely bent on its basal line. Dorsal line somewhat elevated posteriorly, but not at all compressed, behind with a slight sinus ..... **nigrocinctus** VanD.
- AA. Terminal areole triangular at base.
  - B. Color bright green, fading to yellowish.
    - C. Pronotum short, scarcely surpassing abdomen.
      - Spots on face and crescents over eyes (pronotal callosities) black ..... **pallida** VanD.
    - CC. Pronotum long, extending beyond abdomen half way or more toward apex of elytra. Face immaculate.
      - Larger species,  $6\frac{1}{2}$ –7 mm., usually washed with reddish posteriorly; elytral basal hook broad and blunt.... ♀ **flava** Godg.
      - Smaller species, 6– $6\frac{1}{2}$  mm., without reddish wash; elytral basal hook more slender, upturned apically..... ♀ **evelyna** n. sp.
  - BB. Color light green, apical half bright pink. Length  $5\text{--}6\frac{1}{2}$  mm.
    - pubescens** var. **australis** n. var.
  - BBB. Color gray, brown or black, marked with lighter.
    - D. Elytra with dark band across middle.
      - E. Gray without reddish shades; vittæ white; mid-elytral band black. Rather robust across humeri.
        - Pronotum gray with more or less admixture of pale buff; between lateral and sub-apical vittæ blackish; apex of pronotum very acute. Length 6 mm. .... ♀ **grisea** n. sp.
      - EE. Testaceous to reddish brown; vittæ cream; mid-elytral band dark brown. Slender.
        - Pronotum pale testaceous; pattern almost obsolete, except at mid-lateral pronotal margin. Length  $5\frac{1}{2}$  mm.
          - ♀ **flaviguttula** Godg.
        - Pronotum light reddish brown to dark ferruginous or black; pattern well defined, though often interrupted by excess of pigment. Length ♂  $5\text{--}5\frac{1}{2}$  mm., ♀  $5\frac{1}{2}$ –6 mm.
          - flaviguttula** var. **definita** n. var.
    - DD. Elytra without dark band across middle.
      - F. Pronotum light brown, darker posteriorly.
        - Anterior half of pronotum more or less mottled with yellowish green; face and legs greenish yellow; arcuate lateral and subapical vittæ yellow varying to white. Length  $5\frac{1}{2}$  mm. .... ♂ **evelyna** n. sp.
  - FF. Pronotum gray or grayish brown anteriorly, lighter just beyond middle.

Apical half of pronotum brown with white subapical vitta; hairy, broad, almost reaching apex of elytra in female. Length 5-5½ mm. ... **compacta** Gibs. & Wells.

FFF. Pronotum dark brown, darker anteriorly, to black.

G. Pronotum shining; not mottled.

Reddish brown to black; slender, 6-7 mm., in length; face, subapical and more or less arcuate lateral vittæ, bright yellow, varying to white; legs pale, femora usually black anteriorly.

♂ **fraterna** Gibs. & Wells.<sup>1</sup>

Rich brown; very slender, 4½-5½ mm. in length; broad, straight yellow marginal (♀) or sub-marginal (♂) vitta from eye to just beyond middle, with a transverse subapical vitta in the male.

**flavicephala** Godg.

Dark brown; robust, 5-5½ mm. in length; narrower, strongly arcuate cream-colored vitta from over humeri to mid-lateral margin. ... ♂ **pubescens** Emmons.

Dark brown to black; much larger and heavier, 7-8 mm. in length; vittæ much less strongly defined, at times almost obsolete. .... ♂ **salamandra** Fairm.

GG. Pronotum dull brown, more or less mottled with pale.

Olivaceous brown, usually mottled, especially anteriorly, apically brighter red-brown; vittæ and mid-dorsal pale spot sub-obsolete or obscured by anterior mottling. Densely hairy, robust, smaller species, 5½-6½ mm. in length. .... ♀ **pubescens** Emm.

Dull reddish brown, more or less mottled anteriorly; vittæ and mid-dorsal pale spot cream, usually strongly marked. Very hairy, large robust species. Length 7-8 mm. .... ♀ **salamandra** Fairm.

#### EXPLANATION OF PLATE XXIII.

Figures from which plate was made were drawn by Mr. Chris. E. Olsen.

Fig. 1. *Ophiderma fraterna* Gibson & Wells. ♂. (*O. flava* Goding. ♂. ?)

Fig. 2. *Ophiderma flava* Goding. ♀.

Fig. 3. *Ophiderma evelyna* Woodruff. ♂. Allotype.

Fig. 4. *Ophiderma evelyna* Woodruff. ♀. Type.

Fig. 5. *Ophiderma flaviguttula* Goding. ♀.

Fig. 6. *Ophiderma flaviguttula* Goding var. *definita* Woodruff. ♀. Type.

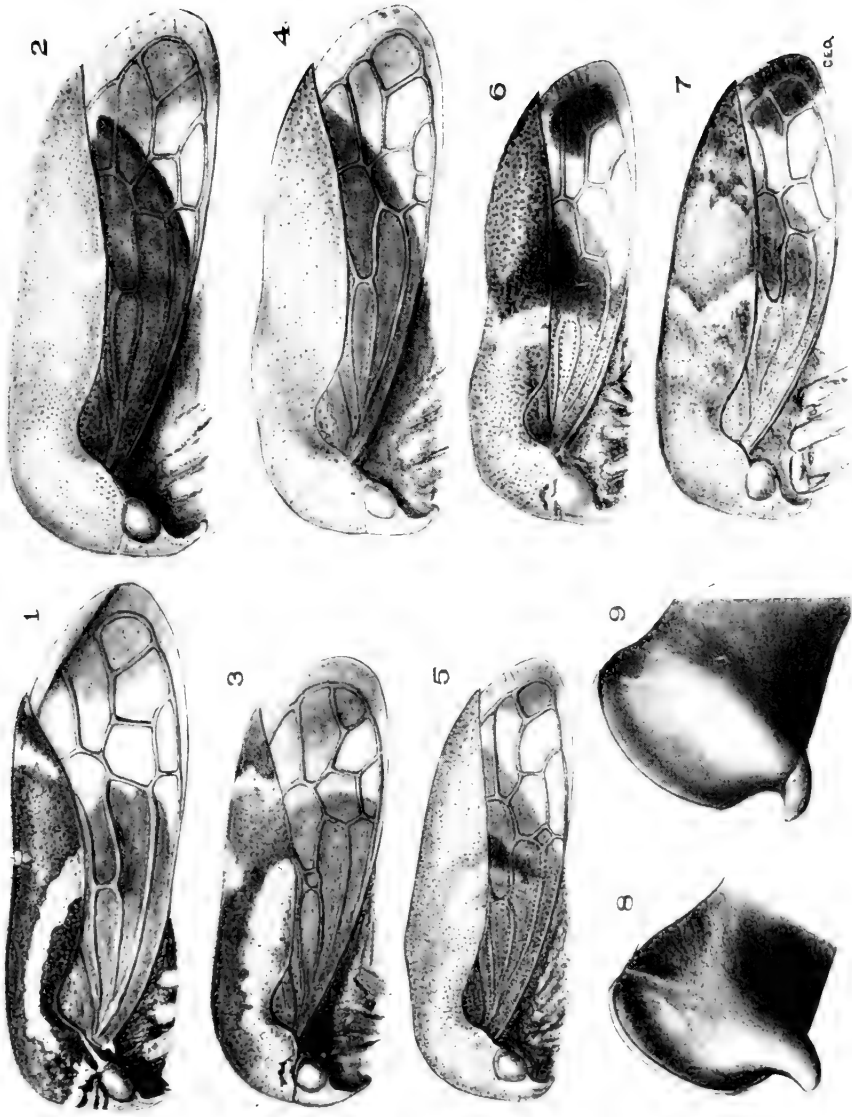
Fig. 7. *Ophiderma grisea* Woodruff. ♀. Type.

Fig. 8. *Ophiderma flava* Goding. Elytral hook.

Fig. 9. *Ophiderma evelyna* Woodruff. Elytral hook.

<sup>1</sup> Regarded by the author, on circumstantial evidence, as the male of *O. flava* Godg.





Membracidae.



## SOME RECORDS OF POLYCTENIDÆ (HEMIPTERA).

G. F. FERRIS,

STANFORD UNIVERSITY, CALIFORNIA.

Of all the assemblage of wierd parasites that infest bats, the rarest are the members of the Hemipterous family Polyctenidæ. There are less than a dozen described species (some of these are in all probability synonyms) and even as late as 1910 an author has stated that there were at that time less than two dozen recorded specimens in collections.

Four species have been recorded from the western hemisphere, one of these being from Jamaica, two from Nicaragua and one from Brazil. As far as I can learn no species of this group has ever been recorded from the United States and as a consequence of this none of our standard textbooks contain any reference to the family. It is therefore something of a privilege to be able to record the first specimens from the United States, even though these appear not to represent an undescribed species. In addition to this I present some records of certain Old World species that greatly extend their known ranges.

**Hesperoctenes longiceps** (Waterhouse)?

? 1880. *Polyctenes longiceps* Waterhouse, Trans. Ent. Soc. London, p. 319, pl. 9.

? 1910. *Hesperoctenes longiceps* (Waterh.) Horvath, Mem. 1<sup>er</sup> Cong. Internat. D'Ent, Vol. 2, p. 251.

Previous records.—From *Molossus abrasus* Guatemala.

Material examined.—From *Eumops californicus*, near San Bernardino, Calif., three adult females, two adult males, two nymphs and one first stage larva. For these specimens (as well as for other interesting things) I am indebted to Mr. A. B. Howell, of Covina, Calif.

Notes.—This determination is entirely provisional. I am not able, on the basis of the literature alone, to indicate any characters by which my specimens may be separated from *H. longiceps*, although it is possible that a direct comparison of specimens might lead to a

different result the figures and description of *longiceps* not being as detailed as might be desired. The differences in host and locality are not in themselves especially significant. My specimens differ from *H. tarsalis* Horvath in their much larger size.

Because of the dubious character of the determination, and even more because of the paucity of information concerning the *Polyctenida* in American publications, I present figures of the species. A detailed description may well be omitted, but I may note that the length of the females is 4.5 mm. and of the males 3.8 mm., the two sexes differing otherwise chiefly in the more slender and pointed abdomen of the male and in the exerted genitalia of the latter sex.

***Eoctenes spasmæ* (Waterhouse).**

- 1879. *Polycctenes spasmæ* Waterhouse, Trans. Ent. Soc. London, p. 312, figs. 3-4.
- 1898. *Polycctenes talpa* Speiser, Zool. Anzeiger, Vol. 21, p. 614, fig. —.
- 1904. *Polycctenes talpa* (Speiser) Speiser, Zool. Jahrb., Suppl. 7, p. 376, pl. 20, figs. 3-5.
- 1906. *Eoctenes spasmæ* (Waterh.) Kirkaldy, Can. Ent., Vol. 38, p. 375.
- 1910. *Eoctenes spasmæ* (Waterh.) Horvath, Ann. Mus. Hung., Vol. 8, p. 573.
- 1910. *Syncrotus talpa* (Speiser) Horvath, Ibid., p. 573.
- 1911. *Hemischizus talpa* (Speiser) Horvath, Ibid., Vol. 9, p. 336.
- 1912. *Eoctenes spasmæ* (Waterh.) Jordan, Proc. Ent. Soc. London, lxiv.
- 1912. *Eoctenes spasmæ* (Waterh.) Jordan, Trans. Internat. Ent. Cong., Vol. 2, p. 343.

Previous records.—From *Megaderma spasma*, Java and Island of Nias.

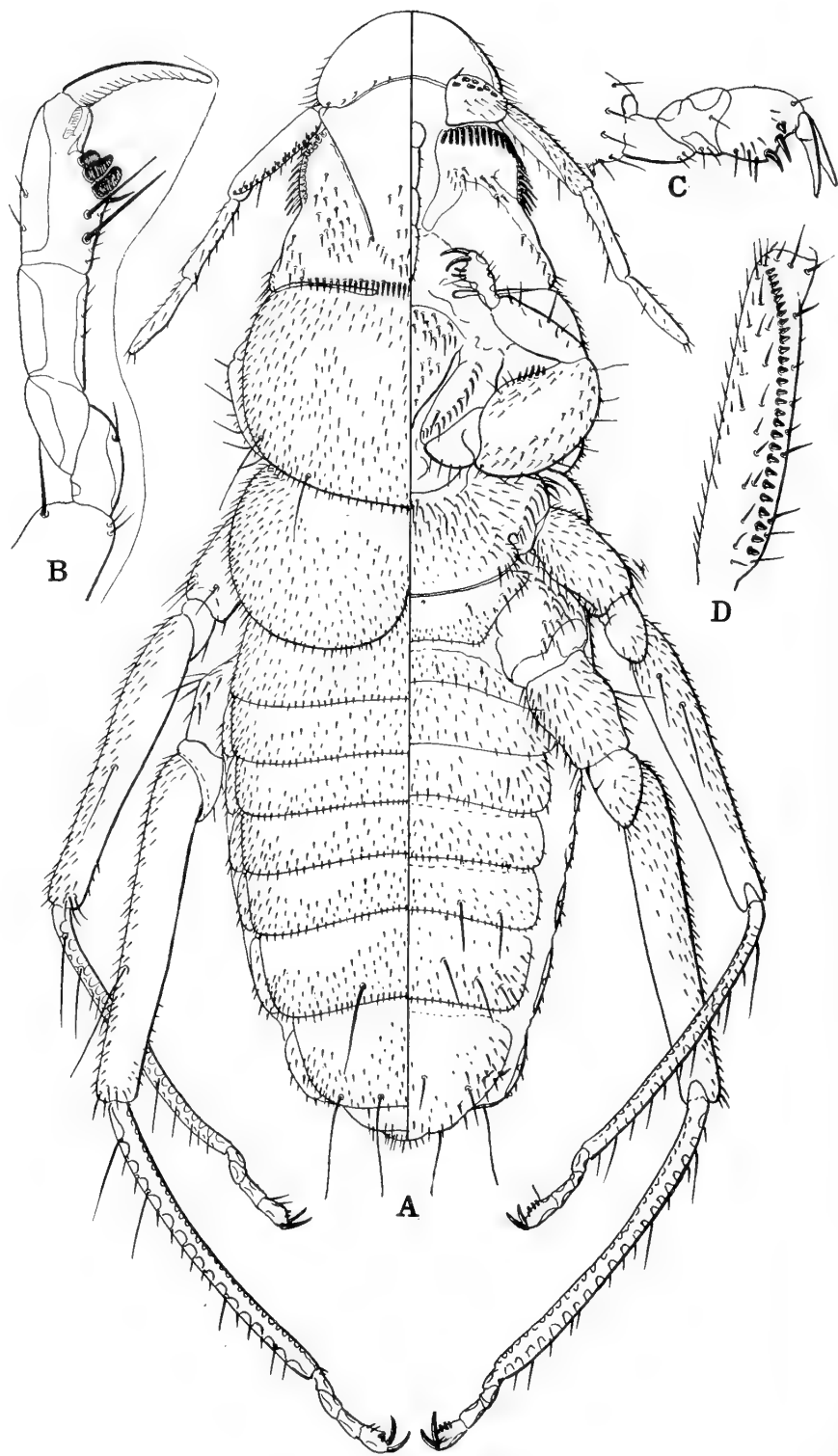
Material examined.—From *Megaderma carinata*, Tanjong Karimata Tua, Karimata Islands, one mature male and two nymphs; from *Cynopterus brachyotis brachyotis* Mankol, Southwest Borneo, one mature female.

Notes.—My specimens agree entirely with the various descriptions and figures of this species.

***Eoctenes intermedius* (Speiser).**

- 1904. *Polystenes intermedius* Speiser, Zool. Jahrb., Supplement 7, p. 373, pl. 20, figs. 1-2.
- 1910. *Syncrotus intermedius* (Speiser) Horvath, Ann. Mus. Hung., Vol. 8, p. 573.
- 1911. *Hemischizus intermedius* (Speiser) Horvath, Ibid., Vol. 9, p. 573.





Polychtenidæ.

Previous records.—From *Taphozous perforatus* Egypt.

Material examined.—From *Taphozous cavaticus*, Tarussan Bay, Sumatra, one adult female.

Notes.—My specimen agrees entirely with the figure given by Speiser. As far as I can see this species is strictly congeneric with the preceding.

#### EXPLANATION OF PLATE XXIV.

*Hesperostenes longiceps* (Waterhouse) ?; *A*, female, left half dorsal, right half ventral; *B*, posterior tarsus; *C*, anterior tarsus; *D*, dorsal aspect of second antennal segment, distal end upward.



## AN AQUATIC DIPTEROUS PARASITE, GINGLYMYIA ACRIROSTRIS TOWNS., AND ADDITIONAL NOTES ON ITS LEPIDOPTEROUS HOST, ELOPHILA FULICALIS.<sup>1</sup>

BY J. T. LLOYD,

ITHACA, N. Y.

Descriptions of the remarkable aquatic immature stages of *Elophila fulcalis* were published in the JOURNAL of the New York Entomological Society in June, 1914, but at that time no mention was made of its Dipterous parasite, *Ginglymyia acrirostris*, and no attempt was made to account for the manner of respiration of the gillless lepidopterous pupa, deeply submerged in the swift waters of Fall Creek.

### *Elophila fulcalis*.

The larva, fig. 6, as stated in the previous article, lives under a thin, irregular web of silk, fig. 1, on stones in the swiftest part of the creek. It is abundantly supplied with gills and its respiration is strictly aquatic.

At the time for pupation the thin, irregular web of the larva is cut away, and is replaced by an impenetrable, oval-shaped, roof-like silk covering, fig. 2, which has a number of semi-circular openings

<sup>1</sup> Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

at the ends facing up and down stream. Under this covering the life of the pupa is spent.

In 1914, when the previous article was written, it was not understood how the pupa, with its four tubular spiracles and absence of gills, could respire beneath the surface of the water. Later experiments, however, show that though the pupa is beneath the surface of the water, its back at least, on which the spiracles are located, is surrounded by air.

To determine whether the pupa cases contained air or water, stones on which they were attached were slid beneath the surface of the creek to a locality where the water was quiet. Here the cases were pulled loose from the rocks, and each one was found to contain a bubble of air, which had collected beneath the roof of the pupal case in the well aerated water of the riffles.

The necessity for this air explains the death in our breeding cages of more than fifty pupæ in their cases which had been removed from the rocks, though almost every one that was left on the rocks survived till maturity.

#### *Ginglymia acirostris*.

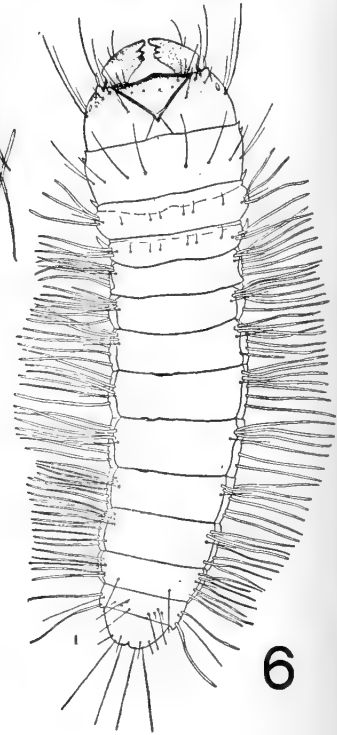
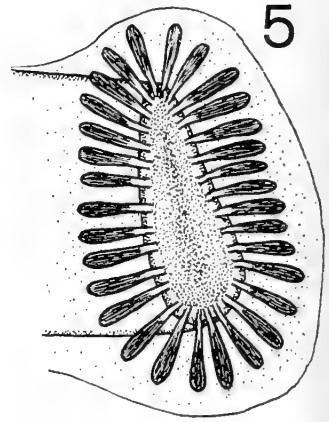
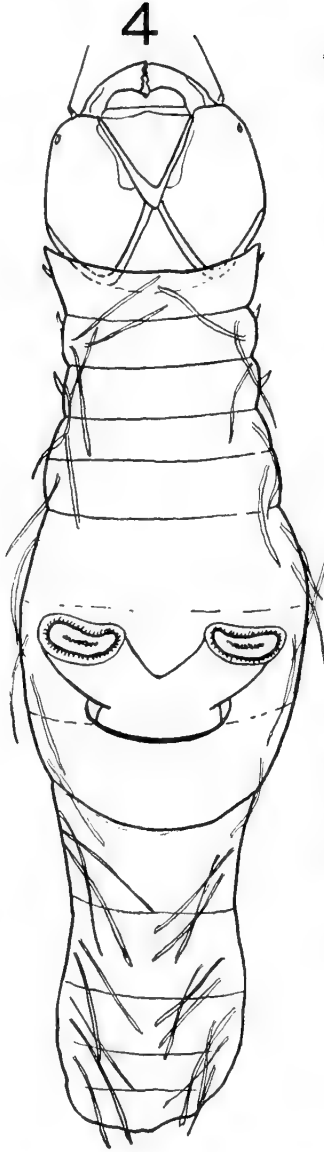
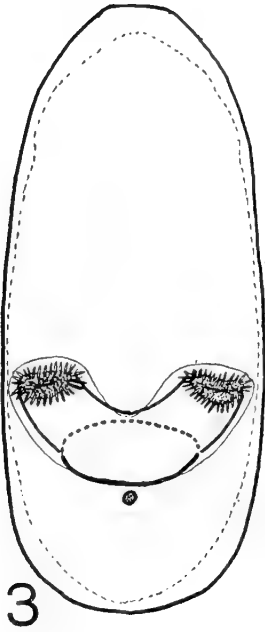
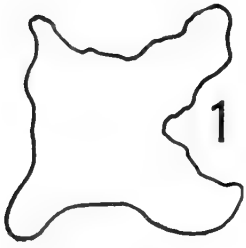
Of more than one hundred specimens of *Elophila* collected in Fall Creek in August at least fifty per cent. were parasitized by *Ginglymia acirostris*, a Tachinid fly. The infested specimens contained the withered remains of the lepidopterous larvæ and the puparia of the parasite, a single puparium to a larva. The silken pupal cases of the infested hosts seemed perfectly normal.

In form the puparium, fig. 3, is oval, 5 mm. long and 2 mm. wide. Its color is amber brown. On the dorsal surface it has two conspicuous eye-like spiracles connected by a U-like structure which points away from the head. The U connecting the spiracles represents respiratory tubes of the last larval instar. It penetrates the puparium through a single circular opening at its base. Behind the circular opening where the respiratory tubes penetrate the puparium there is a small, heavily chitinized circle, whose function is at yet unknown.

A single larva of *Elophila* was found in the prepupal instar which contained the parasite, evidently in the last instar. In this specimen, fig. 4, the back of the larva on the suture between the fourth and fifth







*Elophila fulcalis.*

abdominal segments is penetrated by the entire length of the respiratory tubes of the parasite. The tubes are white, not heavily chitinized, corresponding in color to the skin of the host; the spiracles are dark brown. The heavily chitinized circle is not visible, evidently being concealed beneath the skin of the host. The abdominal segments of the lepidopterous larva occupied by the parasite are considerably swollen, while those beyond the limits of the parasite are merely empty skin, with but few of the gills remaining. A large number of alcoholic specimens of *Elophila* larvæ were examined and dissected, but no trace of the larval parasite could be found.

It is not as yet known how the eggs of the parasite are deposited, nor, indeed, how those of *Elophila*, the host, are laid.

#### EXPLANATION OF PLATE XXV.

Fig. 1. Larval sheet of *Elophila fulcalis*.

Fig. 2. Pupal case of *Elophila fulcalis*.

Fig. 3. *Ginglymyia acirostris*, puparium.

Fig. 4. *Elophila fulcalis*, parasitized larva showing protruding respiratory tubes of dipterous parasite.

Fig. 5. Spiracle of puparium of *Ginglymyia acirostris*.

Fig. 6. *Elophila fulcalis*, larva.

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## ANOTHER NEW SPECIES OF SARCOPHAGA FROM NIAGARA FALLS.<sup>1</sup>

BY R. R. PARKER,

BOZEMAN, MONT.

### ***Sarcophaga yorkii* new species.**

Holotype (male): Collection of writer.

Paratype (male): Collection of writer.

Male.—Arista short plumose on proximal half; one or two bristles in angle formed by side of vitta and the diverging lower end of each row of frontal bristles; calypters whitish with tuft of dark hairs at the fold; leg vestiture short; posterior face of posterior femur with lower row of long bristles; submesotibial bristle absent; anterior acrostichals absent; inner presuturals

<sup>1</sup> Contribution from the Department of Entomology of the Montana State College, Bozeman, Montana.

present; four or more pairs of posterior dorsocentrals: vestiture of fourth ventral plate short and reclinate (not decumbent); posterior portion of fourth notum dull orange, this color extending more forward dorsally; second abdominal segment without marginals: second genital segment dull orange; in profile each forceps prong truncated at end and anterior corner pointed and slightly produced.

Length 11 mm.

HEAD.—Parafrontals, genæ and transverse impression dark, with silvery tinge when viewed from above. Breadth of front at narrowest part one third eye width; cheek height one third that of eye. Front prominent; at its narrowest part frontal vitta three to four times width of each parafrontal, its sides not parallel. Second antennal segment dark; third about twice length of second; arista short plumose on proximal half. Three rows of black cilia behind eyes, vestiture of lower portion of metacephalon black. Cheek vestiture black and coarse. Gena with irregularly placed bristles near lower orbit above transverse impression, elsewhere with short, scattered cilia. Palpi dark.

CHÆTOTAXY.—Lateral verticals absent; vibrissæ inserted very slightly above line or oral margin; each row of frontals extends to base of vitta and lower ends widely divergent with one or two bristles in angles formed by sides of vitta and diverging ends of the rows.

THORAX.—Mesonotum clothed with long slightly reclinate bristles or bristle-like hairs. Epaulets black.

WINGS.—Bend of fourth vein slightly more than a right angle; anterior cross-vein more basal than end of first longitudinal; third vein with bristles, also with scattered bristles beneath (probably variable); anterior basal cross-vein making a distinct right angle with fourth longitudinal (possibly variable); costal spine vestigial, section III of costa longer than section V; calypters whitish with tuft of dark hairs at the fold.

LEGS.—Dark, vestiture short. Anterior face of posterior femur with three rows of bristles, upper and lower rows complete, bristles of intermediate row short and only present centrally; posterior face with complete lower rows of long bristles; femur subcylindrical: tibia very slightly curved or straight: tarsus not shorter than tibia. Anterior and posterior ventral rows of bristles of middle femur present, latter on distal two thirds, former complete: submesotibial bristle absent.

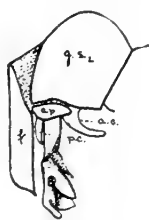
CHÆTOTAXY.—Anterior dorsocentrals scarcely weaker than anterior pairs of postsuturals, much longer than vestiture of prescutum; acrostichals absent; inner presuturals present: four or more pairs of posterior dorsocentrals, last two much the stronger; prescutellar acrostichals present: scutellar apicals present: three sternopleurals; lower sternopleura with bristles and hairs.

ABDOMEN.—Clothed above with short reclinate bristles, beneath with much longer, almost erect hairs. Vestiture of fourth ventral plate short and reclinate with longer, appressed marginal hairs. Posterior portion of fourth notum dull orange, this color extending farthest forward dorsally.

CHÆTOTAXY.—Second segment without dorsal marginal bristles; third with

complete row or with the two dorsal bristles somewhat separated from the laterals; fourth with marginal row well anterior to posterior margin and the dorsal, central bristles still farther forward.

GENITAL SEGMENTS.—Both dull orange or first somewhat brownish: first with long, hairy vestiture posteriorly, marginal bristles absent; second polished, vestiture about length of that on first, anal area small. Forceps darker than second segment, with short upward flap-like prolongations; prongs in profile



truncated at ends and anterior corners pointed and slightly produced; vestiture short except on flap-like prolongations. The figure shows the details of the genital segments (f. = forceps, a. c. = anterior clasper, p. c. = posterior clasper, a. p. = accessory plate, g. s. 2 = second genital segment). Genitalia distinctive.

The holotype and the single paratype were both taken at Niagara Falls, New York, on June 25, but the year and the collector are not recorded.

## NEW NEOTROPICAL MEMBRACIDÆ.<sup>1</sup>

By W. D. FUNKHOUSER,

LEXINGTON, KY.

**Membracis humilis** Fowler, variety **aurora** new var.

This variety answers the description of *M. humilis* Fowler in every particular except that the pronotal markings are brilliant orange in color instead of white. A series of thirty-nine specimens is shown in my collection, eighteen males and eighteen females from Chosica, Peru, and three females from Ecuador. Attempts have been made to change the color of these specimens by various bleaching processes in the thought that the single specimen which Fowler described might have been faded but the color appears permanent. Since both sexes are represented and the series is a fairly long one and represents two localities, I believe this to be a constant color-variety of *humilis*.

The females are slightly larger than the males and both sexes are uniformly black in body color with the markings bright orange. The eyes are

<sup>1</sup> Zoological Laboratory, University of Kentucky.

bright red; the tegmina very dark brown, opaque and slightly pilose; the legs and undersurface of the body black.

All of the specimens were collected by Mr. H. S. Parish of Toronto, Canada. The specimens from Chosica were taken June 9, 1914, and those from Ecuador in August, 1914.

Type of variety: male. Type locality: Chosica, Peru.

***Leioscyta brunnea* new species.**

Dark brown, closely punctate, sparingly pubescent; dorsum nearly straight, very slightly depressed at middle and deflexed at tip; tegmina black at base, brown at middle and luteus-hyaline at tip; undersurface of body brown; legs ferruginous.

Head longer than wide, foliaceous, dark brown, finely and closely punctate, sparingly pubescent; base of head strongly sinuate with a pronounced tubercle above each ocellus; eyes small, not prominent, gray; ocelli small, pearly, farther from each other than from the eyes and situated slightly above an imaginary line drawn through centers of eyes; deep impression at base of median line of head between the tubercles; clypeus broad, flat, foliaceous, somewhat pubescent.

Pronotum uniformly dark brown, closely punctate, sparingly pubescent; metopidium sloping; dorsum nearly straight, slightly depressed and sinuate in middle, roughly sculptured; median carina percurrent, sharp and prominent; a short lateral carina on each side extending from behind humeral angles to base of posterior process; humeral angles not prominent, rounded; posterior process slightly deflexed, acute, triquerate, extending just about to tip of abdomen but not nearly reaching the extremities of the tegmina.

Tegmina black, coriaceous and strongly punctate at base, middle third dark brown and translucent, apical third yellowish and hyaline; five apical and two discoidal areas.

Undersurface of body uniform brown; legs ferruginous; first two pairs of legs weakly foliaceous, hind legs spined and pubescent, the spines tipped with black. Length, 5 mm.; width between humeral angles, 2 mm.

Type: male. Locality: Peru.

Near *L. nitida* Fowler but larger and differing in color and sculpturing of the pronotum. It is doubtful if the generic characters as laid down by Fowler for the genus *Leioscyta* will prove sufficient to distinguish this genus from *Tropidoscyta* Stal when a large number of species are examined. The two discoidal areas of the tegmina are not always associated with the elongate pronotum.

**Centrogonia lutea** new species.

Large, rough, yellow, coarsely punctate, sparingly pubescent: tegmina entirely free, hyaline; posterior process long, narrow, sinuate, extending to a point half-way between tip of abdomen and apex of tegmen; suprahumeral horns thick, heavy, blunt, projecting almost directly laterad as seen from the front; abdomen yellow with segments bordered with brown; legs yellow with brown spots on middle and hind trochanters.

Head about as long as wide, very roughly sculptured, not punctate except for five large black depressions, one at base of head on median line, one on each side of base of head about half way between median suture and eye and one at upper internal angle of each eye, not pubescent except on clypeus; base of head sinuate, highly rounded in middle; eyes prominent, mottled brown, distinctly set off from lateral margins of head and extending laterad half as far as the humeral angles; ocelli prominent, pearly, bordered with reddish, about equidistant from each other and from the eyes and situated slightly below a line drawn through centers of eyes; front of head deeply sulcate down median line and just outside each ocellus and irregularly mottled with brown; genæ arcuate, flanged, with brown spot on median cephalic margin; clypeus longer than wide, extending far below inferior outline of head, convex, pilose with long silvery hairs.

Pronotum yellow in cabinet specimens, probably greenish in life, roughly sculptured, very coarsely punctate, some of the punctures brown, sparingly pilose with long bristling hairs; metopidium perpendicular, strongly hollowed out above each eye, roughly sculptured and punctate, median ridge broad and irregular; humeral angles prominent, obtuse; suprahumeral horns subcylindrical, without carinae, heavy, blunt, extending almost directly outward as seen from the front but directed slightly backward and upward as seen from above and behind, brownish above, luteus below; dorsum nearly straight, median ridge faintly percurrent, lateral semicircular impression pronounced, a few of the coarse punctures irregularly brown especially in posterior region; posterior process long, slender, subcylindrical, luteus faintly mottled with brown, slightly deflexed, extending well beyond apex of abdomen but not reaching tips of tegmina.

Tegmina hyaline, base very slightly punctate, veins strong and yellowish.

Thorax and abdomen yellow with segments of abdomen strongly bordered with brown.

Legs yellow with middle and hind trochanters showing a large brown lateral spot.

Length including tegmina, 10 mm.; width between tips of suprahumeral horns, 4.6 mm.

Type: female. Locality: Bogota, Colombia.

I am indebted to Revdo. Apolinar Maria, Colegio de la Salle, Bogota, Colombia, for the two specimens of this species which I have

seen. Both are females and both were taken at Bogota on *Baccharis bogotensis*, one in 1915 and one in 1917. This is the largest *Centrogonia* which has yet been described. It is near *C. ciliata* Fairmaire, but is a much heavier bodied species than *ciliata* and is quite distinct in sculpturing and maculations. I have received a good series of fifty or more specimens of *C. ciliata* from Revdo. Apolinar Maria from the same locality which were also taken on *Baccharis bogotensis*.

***Centrogonia pingucornis* new species.**

Light brown mottled with yellow, coarsely punctate, sparingly pubescent; suprahumeral horns short, thick and blunt; metapodium much depressed between the horns; head showing a large black spot mesad of each eye; dorsum highest just behind suprahumeral; posterior process slender, acute, extending just beyond tip of abdomen; tegmina hyaline; thorax, legs and abdomen light brown mottled with luteus.

Head wider than long, roughly sculptured, impunctate, light yellow with a large black or very dark brown spot just inside each lateral margin separated from the eye by a yellow line, a smaller spot meso-ventrad of the preceding, a brown line extending vertically on each side of the median line through the ocelli and along the lateral margins of the clypeus; base of head sinuate; eyes large, prominent, gray mottled with brown, well set off from lateral margin of head; ocelli prominent, brown, about equidistant from each other and from the eyes and situated on a line drawn through centers of eyes; clypeus much longer than wide, produced for more than half its length below lateral margins of genæ, convex, densely pilose, tip produced and strongly marked with black.

Pronotum light brown with yellow markings on the anterior and posterior bases of the suprahumeral horns, on the lateral margins of the semicircular impressions and across the base of the posterior process; suprahumeral horns short, very thick, stout, sub-triquerate, blunt, no longer than their width at base, coarsely punctate, somewhat brown above, extending outward and upward with tips slightly recurved; metopodium perpendicular, convex below bases of horns, much flattened between the horns; dorsum a little upraised immediately behind horns then straight to tip of posterior process; median carina percurrent; posterior process narrow, acute, very slightly deflexed at tip, extending just beyond apex of abdomen but not reaching bases of terminal cells of tegmina.

Tegmina hyaline, base slightly punctate, tips somewhat wrinkled, terminal cells of coastal border often subdivided to form six or seven terminal cells, two discoidal.

Thorax light brown spotted with yellow; abdomen luteus with a small brown spot on the lateral margin of each segment; legs light brown spotted with luteus, tips of tibiæ darker, densely pilose.

Length, 6.6 mm.; width between tips of suprahumeral, 2.8 mm.



Type: female. Locality: Chosica, Peru (altitude 2,800 ft.). Collector: Parish.

Described from two females and two males collected by Mr. H. S. Parish at Chosica, Peru, on June 9, 1914. The males are slightly smaller and considerably darker than the females. This species is near *C. elegans* Fowler, but is very distinct in the shape of the supra-humeral horns and metopidium.

***Stictocephala elevata* new species.**

Large, reddish-brown, coarsely punctate, not pubescent; pronotum very high in front; lateral carinæ of metopidium not sharp and meeting almost directly above the humeral angles; tegmina yellowish hyaline, slightly coriaceous and punctate at base, veins prominent and reddish; thorax and abdomen reddish-brown; legs reddish-brown with tips of tibiæ broadly bordered with black, claws dark brown or black.

Head triangular, reddish-brown, roughly sculptured, not punctate, shining; base of head sinuate, depressed near eyes, upraised in middle; eyes large, prominent, brown; ocelli very large, yellowish, bordered with red; lower margins of genæ sinuate; clypeus very long, extending for more than two thirds its length below the inferior margin of the head, gradually narrowing toward the tip, not pubescent, impunctate, smooth, shining.

Pronotum uniformly reddish-brown, coarsely and evenly punctate, not pubescent, very high in front, highest just above humeral angles; median carina sharply and strongly percurrent; semicircular impressions distinct; metopidium perpendicular, only slightly convex, sides not sharply carinate but lateral angles meeting above at a point about on a line with the humeral angles; dorsum almost straight from top of metopidium to apex of posterior process; posterior process long, slender, acuminate, very slightly deflexed at tip, tip minutely black, extending just beyond apex of abdomen and about to the base of the apical cell of tegmen.

Tegmina yellowish-hyaline, slightly reddish, coriaceous and punctate at base; veins strong, reddish and irregularly punctate particularly in basal area.

Thorax and undersurface of body uniformly reddish-brown. Legs reddish-brown; distal ends of tibiæ broadly banded with black; claws black.

Length, 8.5 mm.; width between humeral angles, 3 mm.; height from apex of clypeus to crest of metopidium, 4.4 mm.

Type: female. Locality: Marcapata, Peru.

I have this species also from Callanga, Peru. The species of Membracidæ belonging to the genera *Ceresa* and *Stictocephala* are inclined to change color decidedly in museums. In life they are usually green or greenish which color changes to yellowish or red-

dish when dried. The specimens before me are cabinet specimens of some age and are probably much brighter and greener in life.

**Stictocephala nigriventris** new species.

Greenish yellow mottled with brown, coarsely punctate, sparingly pilose; abdomen densely black; suprahumeral angles very prominent suggesting undeveloped horns; lateral angles of metopidium indefinite; tegmina hyaline, veins yellowish; legs yellow, outer surfaces of trochanters and femora marked with black; general aspect of a *Centrogonia* but without horns.

Head broader than long, with perpendicular brown fascia, roughly sculptured, not punctate, not pubescent; base of head sinuate, highest in middle; eyes prominent, dark brown, extending laterad from the head almost as far as the humeral angles; ocelli small, yellowish, placed on elevations, slightly nearer to each other than to the eyes and situated about on a line drawn through centers of eyes; clypeus much longer than wide, produced for nearly two thirds its length below margins of genæ, convex, impunctate, pilose, tip black; margins of genæ strongly sinuate.

Prothorax greenish-yellow, irregularly mottled with light brown and ferruginous, deeply and evenly punctate, sparingly pilose with long stiff black hairs particularly in anterior region; humeral angles prominent, auriculate; above the humeral angles are strong rounded elevations which are not, however, produced as horns; metopidium sloping, somewhat convex, lateral angles not distinct; dorsum straight, median carina percurrent, lateral semicircular impression weak; posterior process gradually acute, tip minutely black, extending almost to tip of abdomen.

Tegmina hyaline, base slightly opaque, coriaceous and punctured, veins yellowish.

Thorax concolorous yellow; abdomen entirely black; legs yellow with outer surfaces of trochanters and femora black; claws black.

Length including tegmina, 5.5 mm.; width between humeral angles, 2.2 mm.

Type: female. Locality: Ecuador. Collector: Parish (Aug., 1914).

This species must be placed in the genus *Stictocephala* although in general appearance it strongly resembles a *Centrogonia*. It shows neither the suprahumeral horns typical of the *Centrogonia* nor the lateral angles of the metopidium characteristic of *Stictocephala*. I have this species also from Cali, Colombia, collected by Mr. Parish on May 29, 1914.

**Stictolobus erectus** new species.

Uniform light yellow, evenly and coarsely punctate, sparingly pilose with stiff black hairs; pronotum somewhat compressed, elevated; metopidium convex, a little higher than wide, entirely without lateral angles between humerals

and median carina; pronotum resembling that of an *Atymna*; tegmina with the venation of a *Stictocephala*; thorax, undersurface of body and abdomen immaculate light yellow; legs pale yellow with distal ends of tibiæ and the claws brown.

Head broader than long, lemon yellow, roughly sculptured, not punctate, not pubescent except on clypeus; base of head weakly sinuate, highest in middle; eyes prominent, pale yellow with perpendicular fasciæ of brown; ocelli very prominent, yellowish, bordered with brown, nearer to each other than to the eyes and situated about on a line drawn through centers of eyes; margins of genæ sinuate; clypeus longer than wide, extending for more than half its length below inferior margins of genæ, concolorous pale yellow, impunctate, pilose with long white hairs, tip slightly swollen.

Pronotum yellow, evenly punctate, sparingly pilose, somewhat compressed laterally; dorsum subarcuate, highest above humeral angles, almost straight from highest point to base of posterior process; metopidium lightly convex, higher than wide, a smooth ovate area above inner margin of each eye; median carina distinctly percurrent; semicircular impression well marked; posterior process short, slender, acuminate, extending just beyond apex of abdomen, slightly deflexed, tip minutely black.

Tegmina hyaline, base very slightly coriaceous and punctate; venation agreeing in all respects with that of species of the genus *Stictocephala*; veins prominent, yellowish, irregularly tinted with brown; tegmina and hind wings both showing a strongly stylate and petiolate apical cell.

Thorax and abdomen uniformly lemon yellow; legs yellow; tibiæ hairy and spined; distal ends of tibiæ bordered with brown; claws entirely brown.

Length, 7 mm.; width between humeral angles, 2.7 mm.; height of crest from tip of clypeus, 3.5 mm.

Type: male. Locality: Para, Brazil.

Described from two males and two females, all from the same locality. The sexes agree in size and color. I suspect that the genus *Stictolobus*, erected by Metcalf for the accommodation of *subulatus* Say, will eventually receive several species which have been described in the genus *Stictocephala*.

#### ***Atymna pilosa* new species.**

Pale greenish yellow without markings, evenly and finely punctate, densely pilose; pronotum somewhat compressed laterally; dorsum subarcuate, highest before humeral angles; tegmina hyaline, basal half of costal area strongly punctate; thorax, legs and undersurface of body uniform greenish-yellow.

Head wider than long, very convex in center, lemon yellow with a slight tinge of brown around each ocellus, finely punctate, sparingly pubescent; base of head sinuate, depressed at lateral margins, highest over ocelli, depressed in middle; eyes large, prominent, brown, bordered with yellow; ocelli very small,

yellowish, indistinct, nearer to each other than to the eyes and situated about on a line drawn through centers of eyes; margins of genæ forming more or less of a right angle by extending straight mesad from the eyes and then turning sharply downward to the clypeus; clypeus longer than broad, extending for more than half its length below inferior margins of genæ, convex, punctate, densely pilose at tip.

Pronotum rounded in front, compressed behind, concolorous greenish yellow in cabinet specimens, evenly and finely punctate, densely pilose with long grayish hairs; dorsum subarcuate, highest before humeral angles; median carina sharp and strongly percurrent; metopidium convex, about as wide as high, a smooth rounded area at base above each eye; humeral angles prominent, auriculate; posterior process short, thick, blunt, tectiform, slightly depressed, extending almost to the tips of the tegmina.

Tegmina hyaline, very faintly clouded with brown at base and tip; base and costal area slightly punctate; veins more or less indistinct but lightly punctate in basal half of tegmen; tegmina and hind wings with apical cell stylate.

Thorax, abdomen and legs yellow, the hind tibiæ minutely spined and the spines tipped with brown.

Length, 4.8 mm.; width between humeral angles, 2 mm.

Type: female. Locality: Peru.

### ***Ophiderma fascipennis* new species.**

Very small, dark brown with yellow band before apex of posterior process, finely punctate, not pubescent; dorsum strongly sinuate; tegmina with prominent brown band diagonally across apex; head lightly tuberculate at base.

Head broader than long, dark brown with median line and sutures of clypeus clearly and evenly marked with yellow, finely punctate, not pubescent; base of head sinuate, the margin just above each ocellus upraised and swollen into small tubercles; eyes not prominent, brown; ocelli small, distinct, yellow, about equidistant from each other and from the eyes and situated about on a line drawn through centers of eyes; clypeus convex, finely punctate, very slightly pubescent at tip.

Pronotum broad, convex, flattened in front and somewhat swollen behind middle suggesting the genus *Xantholobus*, finely punctate, not pubescent, a broad yellow band at base of posterior process; metopidium broader than high, sloping; percurrent median carina very faint on metopidium but distinct behind middle of body; dorsum sinuate as seen from the side, a slight depression above humeral angles, a deeper one in middle of pronotum and another at base of posterior process; humeral angles prominent, triangular, auriculate, acute at point; posterior process set off at base by broad yellow fascia which is broadest on median carina and narrows rapidly as it approaches the lateral margin of the pronotum giving a triangular appearance as seen from one side, entire process short, triangular, tectiform, blunt, the tip extending well beyond the end of the abdomen but not reaching apex of tegmen.

Tegmina hyaline, base narrowly coriaceous and punctate, veins of middle area suddenly marked with brown, a distinct clean-cut brown band following the terminal veins diagonally across the apex of the wing leaving a rather broad, clear marginal membrane at extremity, this band extends ventro-caudad from the posterior process when the tegmen is folded in its natural position; both the tegmina and the hind wings show the middle apical cells stylate.

Thorax uniform brown; abdomen brown with margins of segments yellow; legs mottled yellow and brown, the distal ends of the tibiæ and the first joint of the tarsi being yellow.

Length including tegmina, 3.6 mm.; width between humeral angles, 1.8 mm.

Type: male. Locality: Bolivia.

This species should be recognized by its very small size, the sinuate dorsum and the characteristic brown fascia across the apex of the tegmen. There is no record of collector, date of collecting or definite locality, as the material in which it was found was purchased from Staudinger-Bang Haas several years ago simply marked "Bolivien."

#### ***Vanduzea punctipennis* new species.**

Green with a semicircular white arc on each side of the pronotum, a white band at base of posterior process and a dark brown spot behind each humeral angle; closely punctate, finely pubescent; pronotum convex in front, swollen and arcuate behind; veins of tegmina strongly and closely punctate, apical cell straight at base, the basal vein of this cell extending transversely across the tegmen; legs and undersurface of body green.

Head subtriangular, broader than long, green, finely punctate, pubescent, sutures distinct; base of head nearly straight, slightly depressed at eyes; eyes prominent, brown; ocelli small, translucent, borders raised, farther from each other than from the eyes and situated about on a line extending through centers of eyes; margins of genæ sinuate; clypeus about as broad as long when viewed from the front, continuing the line of the inferior margin of the genæ, tip reflexed and pubescent.

Pronotum green, finely punctate, pubescent, a white fascia beginning just behind the humeral angles and extending in a semicircle to the lateral border of the pronotum at a point about midway between the humeral angle and the tip of the posterior process, within the anterior half of this semicircle an irregular brown spot, the white arc bordered with brown behind, a white fascia across the pronotum at the base of the posterior process; metopidium convex, broader than high; humeral angles blunt; median carina strongly percurrent; dorsum sloping in front, nearly flat across middle and acute behind, slightly impressed on each side behind the middle; posterior process darker, short, tectiform, acute, extending just beyond tip of abdomen and about reaching the base of the apical cell of the tegmen.

Tegmina hyaline, base coriaceous and punctate, apex slightly clouded; veins very strong and brown and very strongly punctate with brown dots; apical cell with basal veins at right angles to length of tegmen.

Thorax and undersurface of body uniformly green; abdomen green; legs green; tarsi luteus.

Length, 4.8 mm.; width, 2.4 mm.

Type: female. Locality: Cali, Colombia. Collector: Parish (May 24, 1914).

This species bears a strong superficial resemblance to *Vanduzee* (*Hypamastris*) *segmentata* Fowler and may be but a variety of that species. It is quite distinct, however, from the specimens of *segmentata* which I have from Arizona and Texas and which seem to be without question Fowler's species. Fowler credits *segmentata* with a wide range and considerable variation.

***Lycoderes triangulata* new species.**

Large, reddish-brown, coarsely punctate, not pubescent; pronotal horn porrect, subcylindrical at base, forked at extremity, the prongs of the fork narrow, flattened and parallel; posterior process slender, straight, very slightly elevated above the scutellum; tegmina reddish-brown, opaque, coriaceous and punctate except a large triangular area at costal margin near apex which is entirely hyaline and very conspicuous, suggesting the specific name.

Head foliaceous, black, finely and closely punctate, finely pubescent, convex; base of head regularly arcuate; eyes large, prominent, gray; ocelli prominent, shining, orange-colored, much farther from each other than from the eyes and situated well above a line drawn through centers of eyes; margins of genæ sinuate, extended downward to meet apical end of clypeus; clypeus longer than wide, flat, black, pubescent, punctate, continuing the outline of the head as formed by the inferior margins of genæ.

Pronotum reddish-brown, darker in front, very sparingly or not at all pubescent; single pronotal horn porrect, extending forward and upward, the base thick and turriculate, the middle portion subcylindrical, the apex forked, the forked portion being nearly as long as the distance from the humeral angles to the base of the fork, the prongs of the fork continuing the general direction of the horn, nearly parallel, not spreading, as seen from the front they are slightly separated at the bases, nearly touching throughout middle half and again slightly separated at the tips, tips a little swollen with points directed outward; humeral angles prominent, triangular, acute; posterior process long, narrow, straight, cylindrical at base, laterally flattened and sharply carinate for apical two thirds, arising from above the base of the pronotal horn and extending backward and downward to meet the tegmina against which it is closely pressed, the tip of the process not quite reaching the internal angles of the tegmina; scutellum plainly exposed, subtriangular, the open space between the scutellum and the posterior process being small, not much longer than the scutellum and not half as high as long.

Tegmina reddish-brown, opaque, coriaceous and punctate except for a large triangular area near the apex at the costal margin which is entirely clear; this triangle rests with its base on the costal margin of the wing and its apex directed upward, it extends halfway to the tip of the posterior process above and extends from near the apical end of the wing for more than one third the distance toward the base; the veins in the reddish opaque part of the tegmen are prominent and black, those in the hyaline triangle are pale and yellowish.

Thorax and undersurface of the body very dark brown or black, legs black, all of the tibiæ foliaceous, tarsi ferruginous.

Length from front of head to tip of tegmina, 6.8 mm.; length from apex of pronotal horn to tips of tegmina, 9 mm.; length of pronotal horn measuring from humeral angles, 4 mm.; width of pronotum between humeral angles, 1.8 mm.

Type: male. Locality: Sao Paulo, Brazil.

This very interesting and grotesque insect resembles *L. gaffa* Fairmaire in the shape and position of the pronotal process, but is quite distinct from that species in the structure of the posterior process. *L. triangulata* should be recognized by the hyaline triangle on the tegmina and the straight posterior process.

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## NEW GALL MIDGES OR ITONIDIDÆ FROM THE ADIRONDACKS.

BY E. P. FELT,

ALBANY, N. Y.

The species described below were from a fine lot of 648 pinned specimens collected in August and early September, 1917, and generously donated to the New York State Museum by Mr. Howard Notman of Keene Valley and Brooklyn, with the one exception of *Porricondyla johnsoni*, a species characterized in connection with the study of this collection.

An exceptionally large number of non-gall-making forms will be noted, a condition very likely to occur in general collections from heavily wooded areas where an abundance of moist, decaying vegetable débris favors representatives of the more generalized groups.

The midges were collected in nature much as are larger flies and there is really no reason why these minute forms should not be cap-

tured in the open and characterized except that in the case of gall-making species, it is frequently easier to identify the insect through its work and there is no gainsaying the desirability of associating an insect with its gall.

The Adirondack midge fauna is a rich one and still far from being thoroughly explored, though we probably know most of the genera occurring in that section. The following species, in addition to the new forms described below, were taken by Mr. Notman at Keene Valley in late August and early September as follows:

<i>Winnertzia pectinata</i> Felt, Aug. 27.	<i>Lobodiplosis acerina</i> Felt, Aug. 30.
<i>Asynapta saliciperda</i> Felt, Sept. 4.	<i>Feltiella emarginata</i> Felt, Sept. 9.
<i>Camptomyia astiva</i> Felt, Aug. 28.	<i>Karschomyia viburni</i> Felt, Aug. 26.
<i>Dirhiza canadensis</i> Felt, Aug. 14.	<i>Mycodiplosis carolina</i> Felt, Aug. 29.
<i>D. hamata</i> Felt, Aug. 7.	<i>M. cyanoccoci</i> Felt, Sept. 4.
<i>D. multiarticulata</i> Felt, Aug. 29.	<i>M. variabilis</i> Felt, Sept. 4.
<i>Aphidoletes recurvata</i> Felt, Sept. 15.	

*Tritozyga borealis* new species.

A series of this interesting species was taken in early September, the 10th to the 15th, 1917, by Mr. Howard Notman, at Keene Valley. There are structural and colorational characters which appear to separate this form from earlier characterized species, namely *T. sackeni* Felt and *T. fenestra* Felt. Both sexes were captured, though nothing appears to be known concerning the life history of the species.

Male.—Length 1 mm. Antennæ very short, dark brown, composed of nine segments, the second somewhat swollen, subglobose, the third with a length about half its diameter, the fourth with a length one half greater than its diameter, terminal segment compound, tapering and with a length about  $3\frac{1}{2}$  times its diameter. Wings with the venation of *T. sackeni*. Claws moderately long, slender, curved, the pulvilli as long as the claws. Genitalia; basal clasp segment moderately long, stout, terminal clasp segment stout and with a length about  $2\frac{1}{2}$  times its diameter.

Female.—Length 1 mm. Antennæ short, dark brown, with 11 or 12 segments, the terminal long, tapering and with a length  $2\frac{1}{2}$  to 3 times its diameter. Palpi; first segment moderately long, pyriform, the second shorter, with a length about twice its diameter, the third more than twice the length of the second and somewhat dilated. Mesonotum shining dark brown. Scutellum dark reddish brown. Postscutellum a little darker. Abdomen yellowish brown or reddish brown. Wings hyaline, iridescent. Halteres reddish brown. Legs mostly fuscous yellowish. Terminal lobes of ovipositor triarticulate, the last segment orbicular. Type Cecid. 1699.



The coloration of the male is presumably very similar to that of the female. At least no differences were noted prior to the making of the microscopic preparations.

**Konisomyia borealis** new species.

The female described below was taken by Mr. Howard Notman at Keene Valley, September 14, 1917. It is closely related to *K. fusca* Felt, from which it may be separated by differences in color and size and especially variations in antennal structure.

Female.—Length 1.5 mm. Antennæ hardly extending to the base of the head, sparsely haired, dark brown, probably nine segments, the second somewhat enlarged, the fifth with a length a little greater than its diameter, the terminal segment produced, evidently compound and with a length about three times its diameter. Palpi; first segment irregularly quadrangular, the second a little longer, irregular, the third a little longer and stouter than the second, the fourth one half longer than the third and somewhat dilated. Eyes black. Mesonotum dark reddish brown. Scutellum and postscutellum dark brown. Abdomen dark yellowish brown, darker apically. Wings hyaline and nearly as in *K. fusca* except that the fork of the fourth vein is a little shorter and somewhat broader. Halteres fuscous yellowish. Legs a nearly uniform dark yellowish brown. Claws moderately stout, strongly curved. The pulvilli nearly as long as the claws. Ovipositor short, stout, the lobes triarticulate, the terminal segment broadly rounded and sparsely haired. There is in this species as in *K. fusca* submedian globose appendages ventrally on the eighth abdominal segment. Type C. 1700.

**Neptunimyia flavida** new species.

This midge was taken August 23, 1917, by Mr. Howard Notman at Keene Valley, N. Y., and is tentatively referred to this genus, though in the type species the third vein joins costa near the distal fourth and the fourth vein is distinct, while in this new form the third vein is well separated from costa, uniting with the margin near the apex of the wing and the third vein is very indistinct. However, antennal characters and the rather thickly haired wings indicate affinities with *Neptunimyia* and the species is therefore tentatively placed in this genus.

Female.—Length 1 mm. Antennæ extending to the third abdominal segment, thickly haired fuscous yellowish, 10 segments, the fifth with a stem a little longer than the somewhat pyriform basal enlargement, which latter has a subbasal whorl of stout setæ, a smaller subapical whorl of similar setæ and

apically long digitate processes arising from circular pores. Terminal segment somewhat produced with a length over twice its diameter and tapering to an irregularly rounded apex. Palpi, basal segment irregular, second segment with a length over twice its diameter, the third as long as the second, more slender, the fourth nearly  $\frac{1}{2}$  longer than the third and somewhat dilated. Mesonotum reddish brown. Scutellum brownish yellow. Postscutellum darker. Abdomen mostly fuscous yellowish, fuscous apically. Wings moderately broad, rather thickly haired and with a venation suggesting that of *Joannisia*. Subcosta unites with costa before the basal half; there is a distinct cross vein originating at the distal third of subcosta and the third vein joins the margin at the apex of the wing, fourth vein extremely indistinct and only traces of the fifth vein are to be seen. Halteres and legs fuscous yellowish. Claws moderately long, stout, somewhat irregular. The pulvelli rudimentary. Ovipositor short, triarticulate, the basal two segments irregularly rectangular, the terminal segment broadly oval and sparsely setose. Type Cecid. 1710.

***Neocatocha sylvana*** new species.

The peculiar female described below was taken September 6, 1917, by Mr. Howard Notman at Keene Valley, N. Y. It is easily distinguished from other American forms by the small number of antennal segments.

Female.—Length 2 mm. Antennæ  $\frac{1}{3}$  the length of the body, dark brown, 10 segments, the fifth with a stem  $\frac{1}{3}$  the length of the somewhat ovate basal enlargement, the latter with a length  $\frac{1}{2}$  greater than its diameter, sparsely and irregularly clothed with moderately short setæ and apically with a series of digitate processes rising from circular pores; terminal segment somewhat reduced and tapering to an obtuse apex. Palpi, first segment irregularly quadrate, the second a little longer and more slender, the third as long as the second and more slender, the fourth twice the length of the third. Mesonotum shiny dark brown. Scutellum and postscutellum shiny reddish brown with a darker transverse band near the middle. Abdomen fuscous yellowish. Wings slightly fuscous, iridescent, the third vein uniting with the margin before the apex of the wing, the fourth vein indistinct and with a relatively short fork. Halteres dark brown. Legs mostly dark reddish brown, the tarsi with a yellowish cast. Claws simple, finely denticulate apically, the pulvilli as long as the claws, the eighth abdominal segment ventrally with submedian ovate organs. The ovipositor short, triarticulate, the terminal lobes narrowly oval and sparsely setose. Type Cecid. 1720.

***Joannisia borealis*** new species.

The small midge described below falls in the series with the terminal clasp segment broadly rounded apically. It is easily separated from *J. neomexicana* Felt, by the decidedly broader terminal clasp

segment. Taken August 30, 1917, by Mr. Howard Notman, at Keene Valley.

Male.—Length .75 mm. Antennæ twice the length of the body, thickly haired, dark brown, with 16 segments. Palpi, the first segment subglobose, the second longer, broadly oval, the third much smaller, broadly oval. Mesonotum shining dark brown. Scutellum and postscutellum yellowish. Abdomen fuscous yellowish, the distal segments darker. Halteres and legs yellowish. Claws slender, strongly curved, the pulvilli greatly reduced. Genitalia: basal clasp segment moderately long, broad, terminal clasp segment irregularly and broadly oval, the apex without visible spines. Type Cecid. 1703.

**Campylomyza monticola** new species.

The peculiar male was taken August 30, 1917, by Mr. Howard Notman, at Keene Valley, N. Y. It is easily distinguished from other known species by the subapical terminal clasp segment.

Male.—Length .75 mm. Antennæ as long as the body, thickly haired, yellowish brown, ? 16 segments, the 5th with a stem  $\frac{3}{4}$  the length of the subcylindric basal enlargement which latter has a length about twice its diameter, three well-developed crenulate whorls and a rudimentary fourth, terminal segment wanting. Palpi, first segment subglobose, the second a little longer, slender, the third a little shorter than the second and the fourth nearly as long as the third. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen reddish brown. Wings narrow as in *Joannisia*. Halteres and legs yellowish. Claws moderately long, stout, finely denticulate. Genitalia: basal clasp segment moderately long, stout and with a triangular setose process apically, the terminal clasp segment moderately long, slender, and tapering to a subacute setose apex. Harpes irregularly chitinized and apically with irregularly recurved teeth. Type Cecid. 1741.

**Parwinnertzia** new genus.

This genus has the typical circumfli of Winnertzia Rond., from which it may be easily separated by the very narrow wings and the absence of the fifth vein, there being only three long veins, and the biarticulate palpi. Type *P. notmani* n. sp.

**Parwinnertzia notmani** new species.

The remarkable female described below was taken by Mr. Howard Notman July 16, 1917, at Keene Valley, N. Y. Nothing is known concerning its life habits.

Female.—Length 1.5 mm. Antennæ extending to the third abdominal segment, sparsely haired, yellowish brown with twelve and possibly more sessile

segments, the fifth cylindric with a length about  $2\frac{1}{2}$  times its diameter, a sparse subbasal whorl of stout setæ and a scattering subapical band of long, more slender setæ. Slender horseshoe-shaped circumfili extend from the basal third of the segment to a little beyond the tip. Palpi: short, slender, the first segment oval, the second with a length four times its diameter, fusiform, slender. Mesonotum dark reddish brown. Scutellum and postscutellum reddish brown. Abdomen mostly fuscous yellowish. Wings unusually narrow, with a length about three times the width, a well marked crossvein as in *Winnertzia*, the third vein uniting with the margin just beyond the apex of the wing, the fifth vein wanting, the sixth well developed and joining the posterior margin at the basal half. Halteres and legs mostly fuscous yellowish. Claws moderately long, stout, slightly curved, the pulvilli rudimentary. Ovipositor nearly as long as the abdomen, the terminal lobes slender, sparsely setose, triarticulate, the basal segment broadly quadrate, the second segment narrow, the third with a length over twice its diameter and tapering to a narrowly rounded apex. Type Cecid. 1704.

**Didactylomyia robusta** new species.

This midge was taken September 14, 1917, by Mr. Howard Notman, at Keene Valley, N. Y. It is easily distinguished from other males referable to this genus by the somewhat moderate length of the terminal clasp segment.

Male.—Length 1 mm. Antennæ twice the length of the body, rather thickly haired, dark brown, 15 segments, the fifth with a stem  $\frac{1}{4}$  longer than the cylindrical basal enlargement, which latter has a length  $2\frac{1}{2}$  times its diameter, terminal segment somewhat produced, with a length over three times its diameter and apically a slender, somewhat capitate process. Palpi, the first segment with a length nearly twice its width, the second  $\frac{1}{2}$  longer, swollen distally, the third as long as the second, more slender and the fourth  $\frac{1}{2}$  longer than the third. Mesonotum dark reddish brown. Scutellum and postscutellum reddish yellow. Abdomen yellowish brown. Genitalia fuscous. Halteres yellowish transparent. Legs mostly dark brown. Claws moderately stout, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia: basal clasp segment moderately stout, short; terminal clasp segment  $\frac{1}{2}$  longer than the basal clasp segment, rather stout, tapering and curving gently; dorsal plate long, broad, deeply and triangularly emarginate; ventral plate moderately long, rather deeply and roundly emarginate, the lobes finger-like. Harpes moderately produced, chitinized and roundly truncate distally. Type Cecid. 1727.

**Porricondyla johnsoni** new species.

The one male was taken August 23 by Professor C. W. Johnson, at Brookline, Mass. It is closely related to *P. pini* Felt and *P. biden-*

*tata* Felt, it being most easily separated from the latter by the more heavily chitinized and recurved genitalic hooks.

Male.—Length 1.75 mm. Antennæ probably about  $\frac{1}{2}$  longer than the body, thickly long haired, brownish and presumably with 16 segments (only 8 were attached to the specimen), the fifth with a stem twice the length of the cylindrical basal enlargement, which latter has a length about twice its diameter. Palpi: the first segment with a length about three times its diameter; the second apparently as long, the third about twice the length of the second, more slender and the fourth about  $\frac{1}{4}$  longer than the third. Mesonotum dark reddish brown. Scutellum pale yellowish. Postscutellum pale orange. Abdomen reddish brown. Genitalia yellowish. Venter dark brown. Halteres pale yellowish. Legs a pale yellowish brown. Claws missing. Genitalia: basal clasp segment short, broad, the internal basal angle with a heavy, strongly recurved bidentate chitinized hook, the extreme distal margin thickly clothed with stout setæ; terminal clasp segment moderately long, strongly curved, falcate, the distal portion expanded, obliquely truncate and with the tip produced as a narrowly triangular fleshy lobe; dorsal and ventral plates indistinct in the preparation. Harpes forming a heavy, strongly recurved hook apically. Type Cecid. 1343.

***Porricondyla bidentata*** new species.

The striking midge described below was taken August 26, 1917, by Mr. Howard Notman at Keene Valley, N. Y. It approaches *P. pini* Felt, from which it is most easily distinguished by the more strongly chitinized hooks of the genitalia and especially by the bidentate hook distally and internally on the basal clasp segment.

Male.—Length 2 mm. Antennæ  $\frac{1}{2}$  longer than the body, thickly haired, dark brown, the basal segments yellowish, 15 segments, the fifth with a stem  $2\frac{1}{2}$  times the length of the cylindrical basal enlargement, which latter has a length  $1\frac{1}{2}$  times its diameter, terminal segment produced, with a length four times its diameter, the apex a short cone. Palpi: first segment with a length about three times its diameter, the second a little longer, broader, the third with a length about twice the second and the fourth  $\frac{1}{4}$  longer and more slender than the third. Mesonotum dark yellowish brown, the median area lighter. Scutellum and postscutellum pale yellowish. Abdomen rather thickly haired, dark brown, the enlarged genitalia yellowish. Halteres and legs mostly dark straw, the distal tarsal segments of the middle pair whitish. Claws moderately long, stout, unidentate, the pulvilli as long as the claws. Genitalia: basal clasp segment short, broad, the internal basal angle prolonged in a rather stout, recurved, bidentate hook; terminal clasp segment moderately long, strongly curved, falcate, the distal portion expanded, obliquely truncate and with a chitinized spur at the apex; dorsal plate short, broad, the lobes appar-

ently divided, obliquely truncate and sparsely margined distally with stout setæ; ventral plate moderately long, broad, broadly and roundly emarginate, the lobes short truncate and with a few stout setæ apically. Harpes with strongly chitinized, irregular, recurved hooks apically. Type Cecid. 1723.

**Porricondyla spinigera** new species.

This midge, falling in the *P. pini* Felt and *P. hamata* Felt series, was collected September 4, 1917, at Keene Valley, N. Y., by Mr. Howard Notman. It may be easily distinguished from its allies by the long, stout spine at the tip of the terminal clasp segment.

Male.—Length 1 mm. Antennæ twice the length of the body, sparsely long-haired, dark brown, 16 segments, the fifth with a stem twice the length of the cylindrical basal enlargement, which latter has a length  $\frac{1}{2}$  greater than its diameter, the terminal segment reduced, with a length about  $2\frac{1}{2}$  times its diameter and narrowly rounded apically. Palpi: first segment with a length about three times its diameter, the second  $\frac{1}{2}$  longer, the third a little longer and more slender than the second, the fourth  $\frac{1}{2}$  longer than the third. Mesonotum reddish brown. Scutellum pale yellowish. Postscutellum yellowish. Abdomen sparsely haired, fuscous yellowish, genitalia somewhat darker. Halteres pale yellowish. Legs mostly pale straw. Claws rather slender, strongly curved, unidentate, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment short, stout, the internal distal angles apparently with a long, irregularly curved spine, the tip of which touches its complement on the other side; terminal clasp segment moderately short, stout, thickly haired and tapering to a long stout apically chitinous spine, the latter with a length about  $\frac{1}{4}$  the entire segment; dorsal plate long, broad, deeply and narrowly emarginate, the lobes narrowly rounded and sparsely setose; ventral plate long, moderately broad, broadly and roundly emarginate, the lobes short, broadly rounded and sparsely setose; halteres strongly chitinized irregularly and with a distinct retrose spine apically. Type Cecid. 1734.

**Porricondyla tumidosa** new species.

This midge was taken August 27, 1917, by Mr. Howard Notman, at Keene Valley, N. Y. It is related to *P. dilatata* Felt, from which it may be separated by the more slender basal enlargements of the antennal segments and the longer apical spurs on the basal clasp segment.

Male.—Length 1.5 mm. Antennæ decidedly longer than the body, thickly long-haired, dark brown, 16 segments, the fifth with a stem  $\frac{1}{2}$  longer than the cylindrical basal enlargement, which latter has a length  $2\frac{1}{4}$  times its diameter, terminal clasp segment with a length  $2\frac{1}{2}$  times its diameter, thickly haired and tapering to a narrowly rounded apex. Palpi: first segment with a length about

four times its diameter, the second a little longer, stouter, the third a little longer than the second, more slender, the fourth  $\frac{1}{2}$  longer than the third, somewhat dilated. Mesonotum shining reddish brown. Scutellum, postscutellum and abdomen mostly pale yellowish. Genitalia: a light fuscous yellowish and thickly haired. Halteres, legs basally and the tarsal segments mostly pale yellowish, the remainder dark straw. Claws moderately long, slender, slightly curved, unidentate, the pulvilli a little shorter than the claws. Genitalia: basal clasp segment short, stout, the internal distal angle with a curved chitinous spine having a length nearly equal to the diameter of the segment; terminal clasp segment swollen, narrowly oval, thickly setose and with a series of short, stout spines apically; dorsal plate moderately long, broad, deeply and triangularly emarginate, the lobes broadly rounded; ventral plate moderately long, broad triangularly emarginate, the lobes short and thickly setose. Harpes strongly chitinized and tapering to a slightly recurved subacute apex. Type Cecid. 1731.

***Asynapta borealis*** new species.

This female was taken August 28, 1917, by Mr. Howard Notman at Keene Valley, N. Y. It is easily distinguished from related species by the small number of subsessile antennal segments.

Female.—Length 1.5 mm. Antennæ nearly as long as the body, thickly short-haired, light fuscous yellowish, 15 segments, the fifth with a stem about  $\frac{1}{4}$  the length of the cylindrical basal enlargement, which latter has a length twice its diameter. The palpi are over half the length of the antennæ, the first segment has a length about three times its diameter, the second is one half longer than the first, somewhat stouter, the third is more than twice the length of the second, strongly flattened and the fourth is about as long as the third and more slender. Mesonotum reddish brown. Scutellum and postscutellum reddish orange. Abdomen reddish brown, yellowish. Ovipositor about the length of the abdomen. Halteres pale yellowish. Legs mostly dark straw, the distal tarsal segments lighter. Claws moderately long, slender, evenly curved, unidentate, the pulvilli as long as the claws. Terminal lobes of the ovipositor narrowly oval and sparsely setose. Type Cecid. 1729.

***Asynapta dolens*** new species.

The midge was taken by Mr. Howard Notman at Keene Valley, N. Y., September 7, 1917. It runs in the key to *A. furcata* Felt, from which it may be easily separated by the only moderately inflated terminal clasp segment, and its distinctly smaller size.

Male.—Length 1.5 mm. Antennæ  $\frac{1}{2}$  longer than the body, rather sparsely haired, dark brown, the stems whitish, with at least 13 and probably with 16 segments, the fifth with a stem  $\frac{1}{2}$  longer than the cylindrical basal enlarge-

ment, which latter has a length  $\frac{1}{2}$  greater than its diameter and bears a moderately thick whorl of long, stout setæ. Palpi: first segment with a length about three times its diameter, the second  $\frac{1}{2}$  longer, more slender, the third as long as the second, the fourth  $\frac{1}{2}$  longer than the third. Mesonotum dark reddish brown. Scutellum yellowish white. Postscutellum yellowish. Abdomen rather thickly haired, mostly fuscous yellowish, the basal segments and genitalia somewhat fuscous. Halteres whitish transparent. Coxæ and femora basally yellowish, the remainder of the legs mostly pale straw. Claws moderately long, stout, curved, unidentate, the puvilli nearly as long as the claws. Genitalia: basal clasp segment moderately long, stout, terminal clasp segment short, stout; dorsal plate moderately long, deeply and narrowly incised, the lobes narrowly rounded; ventral plate long, broad and broadly rounded. Type Cecid. 1748.

**Camptomyia antennata** new species.

This midge was taken September 15, 1917, by Mr. Howard Notman at Keene Valley, N. Y. It is related to *C. montana* Felt, from which it is easily separated by the larger number of antennal segments and the more produced stems.

Male.—Length 1.5 mm. Antennæ more than twice the length of the body, sparsely haired, yellowish brown, probably with 22 segments, the fifth with a stem  $\frac{1}{2}$  longer than the subcylindrical basal enlargement, which latter has a length  $\frac{1}{2}$  greater than its diameter. Palpi: first segment with a length about three times its diameter, the second segment a little longer than the first, the third about twice the length of the second and the fourth a little longer than the third, the latter two more slender than the basal two. Mesonotum dark brown. Scutellum pale yellowish. Postscutellum yellowish brown. Abdomen mostly dark yellowish brown. Halteres yellowish transparent. Legs mostly dark straw, the tarsi a little darker. Claws moderately stout, strongly curved, unidentate, the pulvilli a little longer than the claws. Genitalia: basal clasp segment moderately long, stout; terminal clasp segment short, stout and narrowly rounded and thickly pectinate apically; dorsal plate long, divided, the lobes broad, obliquely truncate; ventral plate long, deeply and narrowly incised, the lobes broad and tapering to a narrowly rounded and sparsely setose apex. Style rather short, irregular and narrowly rounded apically. Type Cecid. 1728.

**Camptomyia dentata** new species.

This midge was taken September 3, 1917, by Mr. Howard Notman at Keene Valley, N. Y. It is related to *C. montana* Felt, from which it is easily separated by the shorter stems of the flagellate antennal segments and by the markedly different terminal clasp segment.



Male.—Length 1 mm. Antennæ a little longer than the body, thickly haired, fuscous yellowish, probably 21 segments, the fifth with a stem as long as the cylindrical basal enlargement, which latter has a length about  $\frac{1}{2}$  greater than its diameter, terminal segment wanting. Palpi: first segment with a length three times its diameter, irregular, the second  $\frac{1}{2}$  longer, broader, the third  $\frac{1}{2}$  longer than the second, more slender and the fourth a little longer than the third. Mesonotum reddish brown. Scutellum pale yellowish. Postscutellum and abdomen mostly yellowish, genitalia slightly fuscous. Halteres and legs basally pale yellowish, the distal tarsal segments brownish. Claws moderately stout, evenly curved, unidentate, the pulvilli a little shorter than the claws. Genitalia: basal clasp segment moderately long, broad; the terminal clasp segment with a length three times its diameter, roundly swollen distally, internally and subapically with a closely set row of long, stout chitinous teeth; dorsal plate long, broad, deeply and roundly incised, the lobes broad, irregularly truncate and sparsely setose; ventral plate long, broad, very broadly and roundly emarginate, the lobes short and tapering to a narrowly rounded, sparsely setose apex. Type Cecid. 1735.

***Camptomyia pectinata*** new species.

This peculiar male was taken August 26, 1917, at Keene Valley, N. Y., by Mr. Howard Notman. It differs from all its allies by the greatly produced stems of the flagellate antennal segments.

Male.—Length 1.5 mm. Antennæ twice the length of the body, thickly long-haired, dark brown, 20 segments, the fifth with a stem  $2\frac{1}{2}$  times the length of the cylindric basal enlargement, which latter has a length  $\frac{1}{2}$  greater than its diameter, a sparse basal whorl of short setæ and a thick subapical whorl of much longer, stout setæ. Terminal segment produced tapering and with a length about four times its diameter. Palpi: first segment irregularly quadrate, the second segment with a length over twice its diameter, the third with a length more than twice the second and more slender, the fourth as long as the third, and more slender. Mesonotum dark reddish brown. Scutellum pale yellowish. Postscutellum yellowish. Abdomen thickly haired, fuscous yellowish. Halteres pale basally, fuscous apically. Legs mostly dark straw, whitish basally and with the distal tarsal segments lighter. Claws moderately long, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia: basal clasp segment moderately long, stout, terminal clasp segment stout, strongly curved and greatly constricted near the distal fourth; the apex chitinized and margined with numerous stout, closely set spines. Other structures indistinct in the preparation. Type Cecid. 1726.

***Holoneurus inflatus*** new species.

This species was taken September 12, 1917, at Keene Valley, N. Y., by Mr. Howard Notman. It appears to belong in the series with

sixteen antennal segments, though there is one additional. It is easily separated by the distinctly shorter stem of the fifth antennal segment and by genitalic characters.

Male.—Length 1 mm. Antennæ  $\frac{1}{2}$  longer than the body, rather thickly haired, fuscous yellowish, the stems whitish 17 segments, the fifth with a stem as long as the basal enlargement, which latter has a length  $\frac{1}{4}$  greater than its diameter and bears a moderately thick whorl of long setæ. Palpi: first segment with a length nearly three times its diameter, the second nearly twice as long as the first, the third  $\frac{1}{2}$  longer than the second, the fourth about as long as the third. Mesonotum dark reddish brown. Scutellum yellowish white. Postscutellum darker. Abdomen thickly haired, yellowish, genitalia fuscous yellowish. Halteres whitish transparent. Coxæ pale yellowish. Legs mostly pale straw. Claws moderately long, curved, unidentate, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment moderately long, stout; terminal clasp segment short, narrowly and irregularly oval; dorsal plate long, deeply and triangularly incised, the lobes broadly rounded; ventral plate moderately long, divided, tapering and narrowly rounded apically. Type Cecid. 1755.

**Dicrodiplosis insolens** new species.

This peculiar species was taken by Mr. Howard Notman August 12, 1917, at Keene Valley. It is tentatively referred to this genus and is remarkable among female Itonididinaræ on account of the greatly produced circumfili.

Female.—Length 1.75 mm. Antennæ about as long as the body, sparsely haired, dark brown, with at least 13 and presumably 14 segments, the fifth with a stem  $\frac{3}{4}$  of the length of the cylindrical basal enlargement, which latter has a length about three times its diameter, is distinctly and broadly constricted near the middle and has well developed, irregular circumfili basally and apically, the loops with a length about equal to the diameter of the enlargement, there even being a pronounced slackness or bowing of the longitudinal fili connecting the basal and distal circumfili, terminal segment wanting. Palpi: first segment irregular, globose, the second with a length over twice its diameter, the third fully  $\frac{1}{2}$  longer than the second and the fourth nearly twice the length of the third. Mesonotum dark reddish brown. Scutellum and postscutellum yellowish. Abdomen fuscous yellowish. Halteres yellowish transparent. Coxæ pale yellowish. Legs mostly dark brown, the anterior pair with the third, fourth and fifth tibial segments mostly yellowish, the middle legs with the third tibial segment yellowish and the posterior legs with the distal half of the second tibial segment and the third and fourth segments whitish. Claws rather long, moderately stout, strongly curved, unidentate, the pulvilli about  $\frac{1}{2}$  the length of the claws. Ovipositor short, the terminal segment somewhat swollen and

apically a pair of short, tapering, narrowly rounded, thickly setose lobes. Type Cecid. 1763.

**Bremia sylvestris** new species.

The male described below was taken September 15, 1917, at Keene Valley, N. Y., by Mr. Howard Notman. It is related to *B. borealis* Felt, from which it is most easily separated by the yellowish and dark brown abdomen and the markedly shorter basal portion of the stem.

Male.—Length 1.5 mm. Antennæ twice the length of the body, thickly haired, dark brown, 14 segments, the fifth having stems with a length 3 and  $4\frac{1}{2}$  times their diameters respectively. Terminal segment with a length six times its diameter, the distal part of the stem slender and with a length 5 times its diameter. Palpi: indistinct in the preparation. Mesonotum yellowish brown. Scutellum, postscutellum and basal abdominal segments yellowish, the third and following dark brown. Halteres yellowish basally, fuscous apically. Coxæ and femora basally fuscous yellowish, the distal portion of femora and tibiæ dark straw, the tarsi darker. Claws short, stout, strongly curved, the pulvilli rudimentary. Genitalia: basal clasp segment moderately short, stout, terminal clasp segment rather long, stout; dorsal plate long, broad, divided, the lobes tapering to a narrowly rounded apex, thickly clothed with short setæ; ventral plate moderately long, broad, deeply and triangularly emarginate, the rather broad lobes narrowly rounded. Style moderately short, stout. Type Cecid. 1746.

**Lobodiplosis borealis** new species.

This interesting male was taken at Keene Valley, N. Y., September 4, 1917, by Mr. Howard Notman. It is easily distinguished from *L. acerina* Felt by the subapical position of the broadly rounded lobe on the basal clasp segment.

Male.—Length .9 mm. Antennæ twice the length of the body, thickly haired, reddish brown, 14 segments, the fifth having stems with a length 2 and  $2\frac{1}{2}$  times their diameters respectively. Terminal segment produced, the basal portion of the stem with a length about four times its diameter, the distal part somewhat produced and irregularly fusiform. Palpi: first segment irregular, the second a little longer, more slender, the third a little longer than the second and the fourth a little longer and more slender than the third. Mesonotum dark reddish brown. Scutellum fuscous yellowish. Postscutellum darker. Abdomen rather thickly haired, dark brown, genitalia yellowish. Halteres whitish transparent basally, slightly fuscous apically. Coxæ fuscous yellowish. Legs mostly dark brown. Genitalia: basal clasp segment rather long, moderately broad and with a roundly quadrate and thickly setose subapical lobe; terminal clasp segment rather short, stout; dorsal plate short, broad, broadly

and roundly emarginate; the lobes divergent and narrowly rounded; ventral plate long, moderately broad, broadly and roundly emarginate, both sparsely setose. Type Cecid. 1753.

***Mycodiplosis intermedia*** new species.

This species was taken by Mr. Howard Notman August 31, 1917, at Keene Valley, N. Y. It is closely related to *M. æstiva* Felt, from which it is easily distinguished by the narrower ventral plate and the distinctly irregularly rounded lobes of the dorsal plate. It is separable from *M. obscura* Felt by the distinct constriction of the basal third of the distal enlargement of the fifth antennal segment and the distinctly broader ventral plate.

Male.—Length 1 mm. Antennæ  $\frac{1}{2}$  longer than the body, thickly haired, fuscous yellowish, 14 segments, the fifth having stems with a length 3 and  $3\frac{1}{2}$  times their diameters respectively. The distal node with a length  $1\frac{3}{4}$  its diameter and distinctly constricted at the basal third. Palpi: first segment short, irregular, the second more than twice the length of the first, the third a little longer, more slender and the fourth  $\frac{1}{4}$  longer than the third and more slender. Mesonotum yellowish brown. Scutellum and postscutellum fuscous yellowish. Abdomen mostly dark brown, the basal segments and genitalia fuscous yellowish. Halteres and coxæ whitish transparent. The legs mostly light straw. Claws long, strongly curved, slender, the anterior unidentate, the pulvilli about  $\frac{1}{2}$  the length of the claws. Genitalia: basal clasp segment moderately long, slender; terminal clasp segment moderately stout; dorsal plate short, deeply and narrowly incised, the lobes broad, irregularly rounded and sparsely setose; ventral plate long, moderately broad, roundly emarginate apically. Type Cecid. 1784.

***Mycodiplosis lenis*** new species.

This species was taken August 13, 1917, at Keene Valley, N. Y., by Mr. Howard Notman. It is closely related to *M. robusta* Felt, from which it is most easily separated by the markedly different color characters, the distinctly less produced internal angles of the lobes of the dorsal plate and the longer stems of the fifth antennal segment.

Male.—Length 1 mm. Antennæ twice the length of the body, thickly haired, fuscous yellowish, 14 segments, the fifth having stems with a length 3 and  $3\frac{1}{2}$  times their diameters respectively, the distal enlargement with a length over  $\frac{1}{2}$  greater than its diameter and distinctly constricted at the basal third; terminal segment greatly produced, the basal portion of the stem with a length five times its diameter, the distal enlargement cylindric, with a length four times its diameter and apically with a long finger-like process. Palpi: first

segment short, irregular, the second more than twice the length of the first, somewhat dilated, the third a little longer, more slender and the fourth still longer and somewhat dilated apically. Mesonotum reddish brown. Scutellum and postscutellum fuscous yellowish. Abdomen thickly haired, mostly yellowish brown, yellowish basally, genitalia yellowish orange, slightly fuscous apically. Halteres yellowish transparent, fuscous subapically. Coxæ pale yellowish. Legs mostly dark straw. Claws long, slender, strongly curved, the pulvilli about  $\frac{1}{2}$  the length of the claws. Genitalia: basal clasp segment moderately stout; terminal clasp segment rather long, dorsal plate broad, deeply and narrowly emarginate, the lobes roundly and obliquely emarginate, the distal angles distinctly produced, the internal angles slight; dorsal plate long, broad, slightly constricted subapically, roundly emarginate distally. Type Cecid. 1783.

**Hyperdiplosis insolens** new species.

The male was taken by Mr. Howard Notman August 26, 1917, at Keene Valley, N. Y., and is provisionally referred to this genus. It is easily recognized by the extremely short basal portion of the stem of the fifth antennal segment, the triangular emargination of the dorsal plate and the somewhat heavily chitinized harpes suggesting the condition in *Lobodiplosis*. It falls in the series with *H. eupatorii* Felt and *H. americana* Felt.

Male.—Length .75 mm. Antennæ twice the length of the body, thickly haired, yellowish brown, 14 segments, the fifth having stems with a length  $\frac{1}{2}$  and twice their diameters respectively, the distal enlargement subcylindrical, with a length about twice its diameter, the circumfilii moderately long, the loops having a length about equal to the diameter of the enlargement; terminal segment, basal portion of the stem with a length twice its diameter, the distal enlargement with a length three times its diameter and apically a long, irregular finger-like process. Palpi: first segment with a length about twice its diameter, the second nearly twice the length of the first, the third a little longer than the second and the fourth a little longer than the third. Mesonotum dark reddish brown. Scutellum pale yellowish. Postscutellum darker. Abdomen brownish yellow, genitalia fuscous yellowish. Halteres yellowish transparent. Legs mostly dark straw. Claws moderately long, curved at nearly right angles, the pulvilli less than half the length of the claws. Genitalia: basal clasp segment long, stout, and apically with a short, spined lobe suggestive of that in *Lobodiplosis*; terminal clasp segment moderately long, stout, dorsal plate moderately long, broad, deeply and triangularly emarginate, the lobes triangular and sparsely setose; ventral plate shorter, broadly and roundly emarginate, the lobes short, broad and narrowly rounded. Type Cecid. 1769.

**Lestodiplosis satiata** new species.

This species is an extreme form, placed here, though the prolongation of several dorsal loops of the circumfli suggest a relationship to *Aphidoletes*. The male was collected August 28, 1917, by Mr. Howard Notman at Keene Valley, N. Y. It falls in the key near *L. triangularis* Felt and *L. asclepiæ* Felt, from both of which it is readily distinguished by characters given below.

Male.—Length 1 mm. Antennæ more than twice the length of the body, thickly haired, mostly pale yellowish, the two basal antennal segments and most of the basal enlargements of the others somewhat fuscous; 14 segments, the fifth having stems each with a length  $2\frac{1}{2}$  times its diameter; one or more dorsal loops of the circumfli greatly produced and with a length fully twice that of the normal loops; terminal segments produced, the basal portion of the stem with a length about six times its diameter, the distal enlargement sub-cylindrical, somewhat expanded distally and apically forming an obtuse cone. Palpi: first segment irregular, the second about twice the length of the first, the third a little longer than the second, more slender, the fourth a little longer than the third. Mesonotum dark brown. Scutellum and postscutellum yellowish brown. Abdomen mostly dark brown. Wings rather indistinctly spotted with fuscous, iridescent spots. Halteres whitish transparent. Coxæ and legs mostly dark brown, the distal portion of femora, the distal and basal thirds of tibiæ, the distal half of the second tarsal segment and the third, fourth, and fifth tarsal segments mostly yellowish. Claws rather long, slender, slightly curved, the pulvilli nearly as long as the claws. Genitalia: basal lobe of the somewhat slender basal clasp segment unusually small, dorsal plate short, deeply and narrowly emarginate, the lobes broad, irregularly rounded and setose; dorsal plate moderately long, broad, broadly rounded and thickly setose apically. Type Cecid. 1775.

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## NOTES AND NEW SPECIES OF BEMBIDIUM.

BY HOWARD NOTMAN.

BROOKLYN, N. Y.

In a paper on some coleoptera collected at Cochrane, Ontario (JOUR. N. Y. ENT. Soc., Vol. XXVII, p. 92), the writer described a species of *Bembidium* to which he gave the name *B. lengi*. A further study of the descriptions of related species and the collection of more material indicate some points of interest worthy of mention.

In the *Fauna Boreali Americana* (Vol. IV, p. 57) Kirby described a *Bembidium* (*Notaphus*) *nigripes*. This species seems satisfactorily identified as a small black-legged form allied to *B. patrule* and *B. posticum*. A large series was collected at Cochrane where it is abundant. Mannerheim later described a different species, taking it for Kirby's (Bull. Mosc., No. 2, 1852, p. 300). Leconte discovered this error and named the species described by Mannerheim, *B. incrematum* (Proc. Acad. Nat. Sci. Phila., 1860, p. 316). He says: "The Russian American (species) described as *B. nigripes* (Kirby) by Mannerheim, is totally different, being much larger, with the pale bands of the elytra very badly defined and the epipleuræ pale, resembling (in) these characters *B. indistinctum* Dej. from California; it differs, however, from that species by the thorax being more strongly margined, with the posterior angles more rectangular and prominent, and the basal carinæ very distinct; the dorsal line and impressions are likewise deeper. In all these respects it agrees with *B. approximatum* Lec., but differs by the punctures of the elytral striæ being larger and less closely placed. The femora are dark: in *B. approximatum* the legs are usually pale, though sometimes dark, in *B. indistinctum* they are always pale. The species will hereafter be known as *B. incrematum*; it differs from all the allied species by the seventh elytral stria being obliterated and represented only by punctures."

In the *Coleoptera* of Michigan (Proc. Amer. Phil. Soc., XVII, p. 594) Leconte described *B. arcuatum*. He says: "Prothorax wider than long, rounded on the sides, strongly sinuate behind, base as wide as the apex; hind angles rectangular, carinate; basal impressions deep, dorsal line well-impressed, transverse impressions feeble. Elytra elongate-oval." Then following the description: "Marquette, Lake Superior. This species resembles *B. flammulatum* (*dentellum*) of Europe, but is wider and less convex. It also greatly resembles *B. incrematum* Lec. from Cal., Oregon and Alaska, but the latter has the elytral markings undefined, and the striæ finer and less strongly punctured."

Hayward in his paper on the genus (Trans. Am. Ent. Soc., IX, p. 97) gives descriptions of two species: *B. graciliforme*, described as new, and *B. dentellum* Thunb. The latter he states to be identical with *incrematum* Lec. and *arcuatum* Lec. Hayward's two species are easily recognized in a series of 79 specimens collected by the writer

at various localities in New York State. *Dentellum* is distinguished by its broader, more parallel form, rufous legs—femora frequently piceous medially—and thorax with sides less strongly curved and base as wide as or slightly wider than the apex; *graciliforme* by its elongate-oval form, testaceous legs, thorax broader and larger, with sides more strongly curved and margins wider, base slightly narrower than the apex.

A study of Leconte's descriptions and the two European specimens of *dentellum* now at hand makes it seem probable that Hayward was wrong in the naming of both of these species. The thorax in the European specimens is broader and flatter with the sides more strongly rounded; they seem very distinct. Also Leconte's description of *arcuatum* agrees better with the species described by Hayward as *graciliforme*, than it does with the *dentellum* of the latter author, for he says, "thorax strongly sinuate behind" and the elytra "elongate-oval"; neither of these phrases could be used so fittingly for the specimens at hand believed to be *dentellum* (Hayw.), in which the sides of the thorax are feebly sinuate and the elytra rather broad and oblong. It seems that Hayward may have been influenced by the above quoted description of Leconte's which is probably misprinted. As it stands it reads, "This species (*arcuatum*) resembles *B. flammulatum* (*dentellum*) of Europe, but is wider and less convex." This sentence is unintelligible taken in connection with the specimens. If, however, the last clause be changed to read, "but (the latter—namely, *dentellum*) is wider and less convex," the description agrees with the specimens and with Hayward's description of *graciliforme*. The species, therefore, which Hayward calls *dentellum* is probably neither that species nor *arcuatum*. It might be *incrematum*; nothing in the original description of the latter conflicts, but in the portion of the description of *arcuatum* quoted, Leconte states that the striæ are finer and less strongly punctured in *incrematum*. Hayward makes no distinction in this respect between the two species he describes, nor is any such difference to be found in the specimens at hand. It seems probable that *incrematum* is allied to *approximatum* and *indistinctum* in which the striation is distinctly finer.

Colonel Casey, in his recent work on this genus (Mem. Col., VIII, 1918, p. 117), does not apparently recognize Hayward's species. He



describes a species which he calls *arcuatum* Lec. and makes *graciliforme* a variety of it. In view of the author's well-known inclinations it is probable that specimens of Hayward's *dentellum* were not included in his material, especially since he makes no mention of the difference in the color of the legs, a difference which holds true throughout the series of 79 specimens collected by the writer in many localities in New York state during two seasons.

It seems, therefore, that Hayward has described a new species under the impression that he was describing *dentellum*, Thunb. repeating Mannerheim's error noted above, that the writer has redescribed this species as *B. lengi* in the paper referred to and that the species may be properly called by the latter name until further evidence is produced.

That *arcuatum* (*graciliforme* Hayw.) and *lengi* (*dentellum* Hayw.) are distinct species is supported by differences in habitat. The specimens of *lengi* taken in the Adirondacks Mountains were obtained by pouring water over leaves and drift among alders on a river sand bar: the specimens collected at Waterville, N. Y., were found along the upper edge of a sloping river sand bank, close to the grass, into which they run unless approached with great caution. *Arcuatum* is found most abundantly often in company with *B. assimile* in low, moist woods in leaves on ground recently under water and not yet dry. *Lengi* shows a decided preference for higher altitudes; the elevation at Waterville is 1,200 feet and at the locality in the Adirondack Mountains nearly 2,000 feet.

The following three species collected in the Adirondack Mts., N. Y., are believed to be new:

***Bembidium occultator* new species.**

Form moderately convex, oblong, sub-parallel, somewhat elongate; color black throughout with faint greenish bronze lustre, stronger on the head and thorax. Head finely but distinctly alutaceous; thorax similar but with the disk obsoletely alutaceous and strongly shining; elytra strongly shining. Head as broad as long, three fourths the width of the thorax and slightly wider than the thorax at apex; eyes strongly convex prominent; frontal grooves single, parallel, arcuate, rather broad and indefinite, not continuous with the clypeal grooves which are narrow, deep, arcuate and terminate in front in foveæ distant from the anterior margin; antennæ about one half the total length of the body, joints more than twice as long as wide; mentum tooth distinct, rounded at tip. Thorax less than one third wider than long, as wide at base

as at apex, slightly more than two thirds the width of the elytra; slightly emarginate at apex, the sides moderately arcuate in front, oblique and just perceptibly sinuate behind; posterior angles obtuse; transverse impressions strong, indistinctly rugose; median line strong, distinctly impressed, abbreviated at either end, basal foveæ large, bistriate; posterior angles strongly carinate; side margins rather broad with reflexed edges. Elytra one half longer than wide, humeri indistinctly angulate, sides sub-parallel to the middle thence broadly and evenly arcuate to the apex; striæ fine, entire, impunctate, the fifth strongly at apex, the sixth and seventh obsolescent, the eighth not distinct from the margin, intervals slightly convex basally on the disk; the third stria with the first dorsal puncture slightly more than one third from the base, the second slightly less than one third from the apex. Length 4 mm., width 1.25 mm. 1 ♂.

Meadow Pond, Mt. Redfield, Essex Co., N. Y., 19 July, 1919, 3000 ft. elev.

This species resembles *B. grapei* somewhat in form. The elytral striation is that of *B. planiusculum* and *B. simplex*. In Hayward's synopsis it would be placed in the group *planatum* and would be distinguished from *quadrifoveolatum* Mann. and *mæklini* Lec. by its narrower thorax. In Col Casey's revision it should probably be placed next *viator* (Mem. Col. VIII, p. 31) from which species it would differ by its narrower and differently shaped thorax and entirely impunctate elytral striæ.

The specimen was collected among sparse grass on a muddy sand bar.

The relationship of the following two species are shown in synoptic form:

A. Legs pale; size very small.

B. Head alutaceous; elytra uniform in color.....**musicola** Hayw.

BB. Head not alutaceous; elytra with basal and basal half of side margins rufo-testaceous .....**semicinctum** Ntm.

(Bull. Bkln. Ent. Soc. XIV p. 129)

AA. Legs dark; size moderately small.

B. Form broad; thorax  $\frac{1}{3}$  wider than long; elytra piceous.

**quadratum** n. sp.

BB. Form elongate; thorax  $\frac{1}{4}$  wider than long; elytra black.

**proximum** n. sp.

**Bembidium quadratum** new species.

Form short, sub-parallel, strongly convex; color black slightly æneous, strongly shining; basal joint of the antennæ, the legs and elytra dark piceous;

head and thorax not alutaceous. Head as broad as long, three fourths the width of the thorax, slightly wider than the thorax at apex; eyes strongly convex prominent; frontal grooves single, parallel, rather strongly marked, extending to the clypeal suture; clypeus with a large fovea either side, indistinctly connected with the frontal grooves; antennæ short, not quite as long as the head and thorax, joints less than twice as long as wide; mentum tooth acute. Thorax one third wider than long, not narrower at base than apex, two thirds the width of the elytra, scarcely emarginate at apex, sides strongly rounded anteriorly, oblique and slightly sinuate posteriorly, becoming parallel for a short distance in front of the posterior angles which are sharply rectangular; transverse impressions very indistinct; median line rather fine, feebly impressed, abbreviated at either end; basal foveæ, large, deep, bistriate, nearly smooth; posterior angles strongly carinate; margin narrow, finely reflexed. Elytra one third longer than wide, humeri rounded, sides parallel and feebly arcuate to the apical third, thence obtusely rounded to the apex; striæ obsolete with the exception of the sutural which becomes deep on the apical third and is continued around the apex joining the eighth which becomes confluent with the margin at basal fourth. The position of the striæ is occupied by rows of coarse, closely placed punctures all of which become obsolete on apical third; the second almost reaches the apex. The punctures of the first two rows are smaller and more closely placed; the seventh row ends at the middle. The third interval with two dorsal punctures near the third stria; the first at basal third, the second at apical third. Length 3.75 mm., width 1.5 mm. 1 ♀.

Moss Pond, Mt. Redfield, Essex Co., N. Y. 17 July, 1919. 4300 ft. elev.

**Bembidium proximum** new species.

This species greatly resembles the foregoing. It is more slender in form. The elytra are black. The antennæ are very slightly more slender. The thorax is one fourth wider than long; the base is slightly narrower than the apex and the sides more strongly rounded in front. The elytra are one half longer than wide, elongate-oval with the sides evenly arcuate from the base to the apex. Length 3.75 mm., width 1.3 mm. 1 ♂.

Moss Pond, Mt. Redfield, Essex Co., N. Y. 17 July, 1919.

These two specimens were collected on a flat partially moss-covered ledge of rock in the beaver meadow in which the above pond is located.

## THE BEES OF PEACEFUL VALLEY, COLORADO.

BY T. D. A. COCKERELL,

BOULDER, COLO.

During the last week of August, 1918, having no holiday this summer, my wife and I ventured to retire for four days to Peaceful Valley, in the mountains of Boulder County. It is a deep valley running east and west, with steep wooded sides, the altitude at the bottom about 8,000 feet above sea level. The biota is characteristically boreal, the plants including such genera as *Linnæa*, *Pyrola*, *Achillea*, *Antennaria*, *Dasytephana*, *Vaccinium*, *Arnica*, *Veronica*, etc. It is above the zone of sun-flowers, but a solitary *Helianthus lenticularis*, of small stature, had developed from some accidentally dropped seed, and was blooming cheerfully. Weeds are not very abundant, but there is a large patch of *Gärtneria tomentosa* (Nutt.) Heller. The principal bee-flowers were found to be *Phacelia heterophylla* Pursh and *Heliomeris multiflora* Nuttall; they are cited below by the generic names only. At one spot, patches of *Phacelia*, *Heliomeris* and *Monarda* grew close together, and it was interesting to note that their bee-visitors were almost all different. Galls of *Rhodites tuberculator* Ckll. were found on the roses. The common butterflies included *Basilarchia weidemeyeri* Edw., *Eurvanessa antiopa* L., *Pieris rapæ* L., *Eurymus alexandra* Edw., etc. Few moths were caught; the most interesting were *Autographa angulidens* Smith and *Crambidia casta* Sanborn. The coccid *Orthesia occidentalis* Dougl. was common; it seems to be specially attached to *Fragaria*. Among wasps the curious *Crabro latipes* Smith was taken. The bee-fauna proved unusually interesting, including the following species:

***Prosopis gaigei*** Ckll. 2 ♀, at *Phacelia* (W. P. Cockerell). New to Colorado.

***Prosopis elliptica*** Kirby. 1 ♀, Aug. 27.

***Andrena apacheorum*** Ckll. 1 ♀, Aug. 25.

***Halictus cressonii*** Rob. Both sexes; all at flowers of *Heliomeris*, except one female from *Phacelia*.

***Halictus ruidosensis*** Ckll. Both sexes. Male at *Phacelia* (W. P. C.).

**Halictus euryceps** Ellis. 2 ♀, at *Phacelia*, Aug. 26 (W. P. C.).

**Halictus hemimelas** Ckll. 1 ♀, Aug. 25. New to Colorado. The abdomen is strongly brassy-greenish; the type, from New Mexico, has the abdomen faintly bronzy or greenish. In all other respects, the Colorado specimen agrees with *hemimelas*, and I am confident that it is the same species.

**Halictus synthyridis** Ckll. 1 ♂.

**Halictus (Chloralictus) phaceliarum** new species.

Female.—Length about 6.5 mm.; robust, with broad head, and eyes not much converging below; face and front olive-green, the front dull and granular, clypeus mainly black; cheeks and metathorax blue-green, the latter shining, with a steely lustre, with minute punctures, sparse on disc; antennæ dark, the flagellum partly red beneath toward apex; hair of face and thorax above tinged with yellow, of cheeks and pleura clear white; area of metathorax large, with an oblique raised line at sides; surface of area with delicate but conspicuous plicæ, complete at sides, but in middle weak and running into a reticulation which does not reach the hind margin; tegulæ smooth, brownish black; wings very faintly grayish, stigma and nervures pale dull reddish-testaceous; legs black, tarsi brownish at apex; hind spur with long spines; abdomen polished, black (including hind margins of segments), not at all metallic; third and following segments (third sparingly on disc), and sides of second, covered with grayish pruinose pubescence.

Peaceful Valley, Colo., Aug. 26, 1918, at flowers of *Phacelia*, collected by W. P. Cockerell.

Variety a. Mesothorax olive green; wings slightly reddish.

Peaceful Valley, Aug. 27 (T. D. A. Cockerell).

Closely related to *H. subconnexus* Ellis, but the sculpture of metathoracic area is much more delicate, the eyes converge less below, and the abdomen is without metallic tints.

There are also in the collection several small species of *Halictus* represented only by males. They do not agree with any identified males, but they may have been described from females, as numerous species are known only in that sex at present.

**Calliopsis coloradensis** Cresson. 1 ♀, Aug. 27, at *Chrysopsis*.

**Perdita affinis** Cresson. 1 ♀, Aug. 27, at *Chrysopsis*.

**Panurginus porterae** Ckll. 2 ♂, Aug. 26, at *Heliomeris*.

**Halictoides oryx** Viereck. Both sexes; females at *Heliomeris*.

**Pseudomelecta interrupta rociadensis** Ckll. One, Aug. 26.

**Triepeolus helianthi pacificus** new subspecies. One male, Aug. 26 (W. P. Cockerell).

I find that the western forms related to *T. helianthi* are at least subspecifically distinct; the differences are indicated in the following table:

**Triepeolus** Robertson.

About 10 mm. long, with a delicate median line on clypeus.....1

Much larger; about 13 mm. long, anterior wing 9.5 mm.; no trace of a line on clypeus; anterior margin of pleura below transverse band hairy; sides of front above with a small punctureless area, but it is not highly polished. (Both sexes, the male the type, at flowers of *Cirsium acaulescens*, Florissant, Colo., July 29, collected by S. A. Rohwer; also a female collected by W. Porter near San Ignacio, New Mexico)...**grandior** new subspecies.

1. Anterior margin of pleura below the transverse band without hairs; upper part of front at sides without shining spaces (Illinois)...**helianthi** Rob.

Anterior margin of pleura below the transverse band broadly hairy; upper part of front on each side with a smooth polished space.

**pacificus** new subspecies.

**Melissodes grindeliæ** Ckll. Females; one at *Grindelia*.

**Anthophora montana** Cresson. Females; one at *Monarda* (W. P. C.).

**Anthophora smithii** Cresson. 1 ♂, at *Monarda* (W. P. C.).

**Anthidium emarginatum** Say. Both sexes at *Phacelia*, abundant (W. P. C.).

**Anthidium porteræ** Ckll. 1 ♀, Aug. 27.

**Osmia fulgida** Cresson. Females common at *Phacelia* (W. P. C.).

**Osmia armaticeps** Cresson. One female at *Phacelia*, Aug. 26 (W. P. C.).

**Osmia wardiana** Ckll. One female at *Phacelia*, Aug. 26 (W. P. C.).

**Osmia copelandica** Ckll. Four females at *Phacelia*, Aug. 26 (W. P. C.).

**Monumetha albifrons** Kirby. One female at *Phacelia*, Aug. 26 (W. P. C.).

**Bombus justus** Cresson. Workers at *Phacelia* and *Helianthus lenticularis*.

**Bombus bifarius** Cresson. Worker at *Helimeris*, Aug. 26.

On the way to and from Peaceful Valley, we had occasion to spend a few hours at Puzzler, alt. 8,700 feet. The bees caught here were **Anthidium tenuifloræ** Ckll., **Melissodes grindeliæ** Ckll., **Megachile relativa** Cresson, and a few others not yet examined.

## A NEW NEMESTRINID FLY FROM CENTRAL TEXAS.

By J. BEQUAERT,

NEW YORK CITY.

For some time past, I have gathered notes on the North American species of the dipterous family Nemestrinidæ, my interest in the group having been aroused by the capture of several specimens during the Cornell Biological Expedition of 1917. Through the kindness of some of my entomological friends I have been able to study much valuable material, including all but one of the species known from America north of Panama. Certain peculiarities of this family, however, render the examination of large series of specimens and the comparison of species from different regions imperative, before its classification can be established on a safe basis. I hope to have time and opportunity to do this in the near future; meanwhile, it seems necessary to publish the description of the following new species, since it has been distributed to several public and private collections.

### *Hirmoneura bradleyi* new species.<sup>1</sup>

Type female from Anhalt, Comal Co., Texas, June 28, 1917 (J. Bequaert Coll.), collection of the American Museum of Natural History.

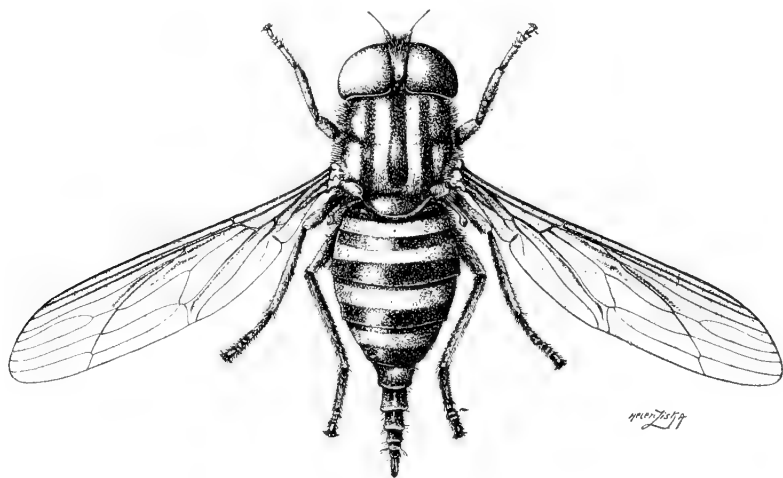
A large-sized, black and rufous or dark brown species, with feeble pilosity; the dorsum of the thorax with conspicuous longitudinal bands, alternately brown and gray pruinose; the abdomen above with white pollinose transverse fasciæ alternating with dark brown bands; antennæ and palpi brownish-red; legs yellowish-brown, hind tibiæ dark brown, hind tarsi black; eyes bare, broadly separated on the front in both sexes; wings with two submarginal cells only; the second submarginal and the second posterior cells broadly open on the margin.

Female.—Integument dark colored, blackish-brown to black, more brownish-red in places and the limits between the different tinges ill-defined, varying from one specimen to another; in some, the abdomen is extensively rufous,

<sup>1</sup> Named for my esteemed friend Prof. J. Chester Bradley, of the Department of Entomology, Cornell University, successful leader of the Cornell Biological Expedition, which during the months of June, July and August, 1917, crossed the United States by automobile; the species described herewith was taken on this journey.

while in others it is clove-brown or almost entirely black. Antennæ, palpi and mouth-parts brownish-red. Legs light orange-yellow; the hind tibiæ and the apex of the hind femora clove-brown, the hind tarsi almost black.

Body feebly pilose, almost bare in general appearance above and often somewhat shining where the pruinosity is rubbed. Vertex and front covered with erect black hairs of medium length; the pilosity on the two basal joints of the antennæ, the palpi and the face pale ochraceous, grayish-white along the posterior orbits; the third antennal joint bare; a pale yellow bloom, easily lost, covers the integument of the head. Dorsum of the thorax with short, sparse, black hairs, except on the sides, where the pilosity is dense, long and soft, pale ochraceous; a long, dense tuft of dirty gray hair behind the insertion of the wing. Scutellum almost bare on its disc, its posterior margin fringed with pale yellowish pilosity. On the under side of the thorax the hairs are short, much scattered, grayish-white. The integument of the thorax is covered above and below with a bright grayish to white bloom, which forms on the dorsum four broad longitudinal bands of almost equal width and distinctly limited by five dull brown pollinose stripes; the bloom of the dark bands is often partly rubbed so that they are more or less shining; of the brown bands the median one is about twice as wide as the others and ends a short distance before the scutellum, the inner lateral pair reaches the scutellum, while the outer lateral pair ends before the base of the wing and is less



*Hirmoncra bradleyi* Bequaert.

well defined being partly hidden in the long lateral pilosity. Abdomen with very feeble tomentum, except on the first tergite and on the basal half of the second where the pilosity is long and dense, yellowish-gray; the remainder of the upper side bears only a few scarcely visible, short, reclining hairs, which are black in the middle and pale yellowish on the extreme sides; the pubes-



cence at the under side is moderately long, scattered, appressed, yellowish-gray. The segments behind the fourth which constitute the retractile ovipositor, bear numerous black, erect hairs. A dense grayish-white bloom covers the entire under side of the abdomen and forms on the dorsal face four sharply defined fasciæ, separated from one another by slightly broader dark transverse bands; these dark bands are covered with a feeble brownish bloom which is readily rubbed, so that the bands are more or less shining. The first tergite is yellowish pollinose with a narrow apical brown band. The second tergite has four fasciæ, alternately pale and brown; the basal band is quite white and of about the same width throughout, while the median fascia is more grayish and slightly widened toward the sides; the apical brown band is broader than any of the other three fasciæ. On the third and fourth tergites the pale band is grayish-white, slightly broader than the pale fasciæ of tergite two and situated close to the basal margin, the basal brown band being very narrow and furthermore often partly retracted beneath the apical margin of the preceding segment. The ovipositor is brownish pruinose, except toward the base of its first tergite which is in part feebly grayish pollinose. Legs densely covered with short, ochraceous hairs, those on the hind tibiæ and hind tarsi black.

Head large, slightly broader than the thorax, a little higher than broad seen in front, almost hemispherical in profile. Front widest above the antennæ, the inner orbits very feebly convergent toward the vertex and a little more so toward the oral depression; at the vertex the front is about one third of the total length of each eye. Ocellar protuberance elongate, very large, deeply separated from the inner orbits by a lateral groove, confluent with the front below. Posterior ocelli much closer to each other than to the anterior ocellus which is slightly smaller. Eyes bare. Antennæ short, small, placed closer to the inner orbits than to each other; their basal joint subcylindrical, gradually but feebly widened from its base to its straightly truncate apex, as long as the two following joints together; second joint transverse, subtruncate at base and apex, about one and a half times as thick as long; third joint flattened, pear-shaped, one and one half times the length of the second, almost as broad at the base as long, gradually attenuated toward its obtuse apex, which bears the style. Style about as long as the entire antenna, distinctly three-jointed; its two basal joints short and thick, together about the length of the second antennal joint; the basal joint much the shortest. Front distinctly swollen below, gradually sloping toward the vertex, much more abruptly so toward the antennæ. Face with a feeble median protuberance above the oral margin, separated from the lower inner orbits by two deep grooves which run nearly to the base of the antennæ and in which the palpi are partly concealed. Proboscis short and thick, with soft, broad, fleshy labella, usually retracted within a deep excavation of the lower half of the face. Palpi very long, slender throughout, rather suddenly attenuated and pointed at their apex, two-jointed, the basal joint extremely short. Body rather broad and flattened. Dorsum of the thorax about as broad as long; the transverse suture feebly marked on

the sides. Scutellum semi-oval, cushion-shaped, its posterior margin distinctly though feebly swollen and separated from the disc by an impressed line. Abdomen oval, its four basal segments together slightly longer than the thorax; first tergite very short, the second much the longest, the third and fourth about of the same length (two thirds that of the second). Ovipositor of the telescope-shaped type, composed of five segments which can be extended to a considerable length or partially retracted within one another; the basal segment is much narrower than the fourth abdominal tergite, the following segments are gradually narrowed, the apical one ending in two slender, straight lamellæ which are obtusely rounded at their tips.

Wings long and narrow, over four times as long as wide, over twice the length of the abdomen and slightly longer than the entire body (not including the ovipositor); feebly smoky all over, brownish-yellow at the base and in the costal and subcostal cells. Costa distinct along the entire hind margin of the wing and reached by the diagonal vein. Only two submarginal cells present, there being no cross-vein connecting the second and third longitudinal veins. All the submarginal and first three posterior cells broadly open on the costa. Anal cell broadly open. Alula well developed, broad.

Measurements of the type: length not including the ovipositor (to apex of tergite 4), 12.5 mm.; length of wing, 14.5 mm.; width of wing, 3.5 mm.

In other females the length (not including the ovipositor) varies from 11 to 14 mm.

Male.—Except for the usual sexual differences, very similar to the female. The vertex is of the same width as in that sex. The markings of thorax and abdomen are the same; the sixth tergite is feebly gray pruinose at the base.

Measurements of the allotype: length, 11 mm.; length of wing, 14.5 mm.; width of wing, 3.5 mm.

In other males the length varies between 12.5 and 14 mm.

I have examined a number of specimens (15 ♀ and 9 ♂) and can find but little difference between them, except in size and coloration as mentioned above, and in certain details of the wing venation. The peculiarities of the venation included in the above description apply to all the specimens. In some of them, a short anterior cross-vein connects the discoidal and the first submarginal cells, while in others this vein is very much reduced or altogether absent. Also in some the discoidal cell touches the fifth posterior cell, while in others these two cells are separated by a distinct though short cross-vein. These and some other minor discrepancies are combined in various ways, as for instance in the specimen figured.

In addition to the type and allotype, a number of topotypes of both sexes have been examined and have been distributed among the following collections: Entomological Department of Cornell Univer-

sity, Museum of Comparative Zoölogy at Cambridge, Museum of the Brooklyn Institute of Arts and Sciences, private collection of Prof. Jas. S. Hine, Mr. C. W. Johnson and of the author.

Paratypes (2 ♀) from Helotes, Bexar Co., Texas, July 1, 1917 (J. Bequaert Coll.), in the author's collection.

The North American Nemestrinidæ usually placed in *Hirmoneura* belong to three very distinct groups, which must, I believe, be treated as genera. *H. clausa* Osten-Sacken is the type of *Parasymmictus* Bigot,<sup>2</sup> which should be considered a valid genus, not merely on account of its eyes (bare, dichoptic in the male) and the peculiarities of the venation (three submarginal cells, the third of which is closed; second posterior cell closed), but more so because the proboscis is aborted, hardly visible, without fleshy labella; furthermore, the palpi are minute and the base of the wing has no alula. *H. texana* Cockerell and *H. brevirostris* Macquart belong in *Hyrmophlaba* Rondani<sup>3</sup> (type: *H. brevirostris*): there are three submarginal cells and the eyes are in both sexes holoptic and densely pilose. *H. flavipes* Williston, *H. psilotes* Osten-Sacken and *H. bradleyi* agree with the type of *Hirmoneura* Meigen,<sup>4</sup> *H. obscura* Meigen, in having only two submarginal cells in the wings and dichoptic eyes in both male and female. In *H. obscura*, however, the eyes are distinctly though shortly pilose,<sup>5</sup> whereas they are completely bare in the three American species just mentioned. This difference is in my opinion of sufficient importance to warrant the making of a new subgenus for these North and Central American forms; moreover, further comparative study may bring to light additional distinguishing characters between these and the typical *Hirmoneura*, which are thus far unknown in North America.

The North and Central American so-called "*Hirmoneura*" may then be separated as follows:

1. Proboscis very small, aborted, hardly visible, without fleshy labella; palpi minute; wings with three submarginal cells, without alula; eyes bare, dichoptic in the male (♀ unknown).....***Parasymmictus*** Bigot.

<sup>2</sup> Ann. Soc. Ent. France (5), IX, 1879, Bull., p. lxxvii.

<sup>3</sup> Archivio per la Zoologia, Modena, III, pt. 1, 1863, p. 51.

<sup>4</sup> Syst. Beschreib. Europ. Zweifl. Ins., II, 1820, p. 132.

<sup>5</sup> Lichtwardt, Deutsch. Ent. Zeitschr., 1909, p. 514.

- a. Black; densely covered with long, erect, yellowish-white pile, which is feebly reclining along the apical margins of the abdominal tergites; third submarginal and second posterior cells closed and long petiolate before the margin of the wing; length, ♂: 10.5-12 mm.

**P. clausus** (Osten-Sacken).

Proboscis well-developed, short, broad and soft, ending in large, fleshy labella; palpi long and slender; wings with broad alula; ovipositor of female telescope-shaped .....2

- 2 Three submarginal cells; eyes densely pilose, holoptic in both sexes.

**Hymnophlæba** Rondani.

- a. Third submarginal cell closed and long petiolate before the margin of the wing; body densely hairy throughout, without pollinose bands; length ♀, without ovipositor: 9.5 mm. ....**H. brevirostris** (Macquart).

Third submarginal cell broadly open on the margin of the wing; body densely pilose, without pollinose bands; length ♀, without ovipositor: 11 mm.; ♂: 11.5-12 mm. ....**H. texana** (Cockerell).

Two submarginal cells; eyes dichoptic, broadly separated by the front in both sexes .....**Hirmoneura** Meigen.....3

- 3 Eyes densely pilose .....**Hirmoneura** proper.

Eyes bare .....**Neohirmoneura** new subgenus.

(type: *Hirmoneura flavipes* Williston)

- a. Thorax densely pilose, the integument covered with a uniform yellowish-gray bloom, without bands; abdomen moderately hairy, brownish-gray pruinose; a white pollinose band at the base of tergite two, beyond it a broader brown band; hind legs entirely yellowish-red; length ♀, without ovipositor: 13 mm.; ♂: 13.5 mm.

**H. flavipes** Williston.

Thorax with yellowish hairs longer on the sides, and with a brownish-yellow pollen; abdomen with a brownish pollen which is darker on the posterior half of tergites 2, 3, 4 (these segments thus showing slight traces of darker cross-bands); the base of the abdomen with longer, pale yellowish-rufous hairs; the posterior half of segment 2, as well as the two following segments, beset with short semicrest black hairs; legs pale rufous, hind femora slightly brownish at the tip, hind tarsi brown; length ♀, without ovipositor: 13 mm. (♂ unknown) .....**H. psilotes** Osten-Sacken.

Body feebly pilose, except at the sides of the thorax and at the base of the abdomen; thorax with conspicuous longitudinal brown and gray pollinose bands; abdomen above with transverse fasciæ alternately brown and white pollinose; legs yellowish-brown; the tips of the hind femora, the hind tibiæ and tarsi dark brown to black; length ♀, without ovipositor: 11-14 mm.; ♂: 11-14 mm.

**H. bradleyi** new species.

From the foregoing key it is apparent that the new species here described belongs in the vicinity of *H. flavipes* and *H. psilotes*. From the former, of which I have seen a male specimen, it is easily distinguished by the characters given in the key. I have not seen the Mexican *H. psilotes*; to judge from the description, it comes very close to *H. bradleyi*. No mention is made by Osten-Sacken of the pollinose bands of thorax and abdomen which are so striking a feature of *H. bradleyi*; yet, it is not impossible that the unique specimen of *H. psilotes* was poorly preserved and rubbed, so that the two species may be more similar than would seem from the descriptions.

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## SYNONYMICAL AND OTHER NOTES ON SOME SPECIES OF THE FAMILY CHRYSOMELIDÆ AND DESCRIPTIONS OF NEW SPECIES.

BY CHAS. SHAEFFER,

BROOKLYN, N. Y.

The extent of variation of some species of the family Chrysomelidæ as given in the latest revisions, etc., was never satisfactory to me. Rearranging the material in some overcrowded boxes lately and studying the species of some genera more critically I became fully convinced that my surmise was correct and that some of the names placed in synonymy or given as varieties at present have to be restored to specific standing. However, I could do this in a very few instances only, as the original descriptions are too poor and I could not see the Leconte types at present. I will undertake a revision of at least two of the genera, *Donacia* and *Disonycha*, in the near future.

### ***Donacia* s. g. *Pæcilocera* new subgenus.**

Our species of *Donacia* are divisible into the two recognized subgenera. Those of Mr. Leng's groups *A*, *B*, and *C* belong to *Donacia* proper and those of group *D* to the subgenus *Plateumaris* Thoms. These of the latter subgenus are more similar in form than those of the subgenus *Donacia* and all possess a very good character in the distinct sinuation of the sutural margin of elytra near apex to separate

them readily.<sup>1</sup> In *Donacia harrisi* we would have a disturbing element if placed in either of the two subgenera. However, this species possesses a unique character not present in any other species and that is the third antennal joint distinctly longer than the fourth in both sexes. In all our other species the third antennal joint is mostly shorter than or subequal to the third. The head is scarcely constricted behind causing the less prominence of the eyes; the posterior femora of the male are armed with one large tooth and several small teeth or denticles on the inner margin and the hind tibiae are feebly angulated internally about one third from apex, which may also be termed feebly emarginate with a few, feeble denticles or tubercles within the emargination. The female has the posterior femora mutic and the posterior tibiae are not emarginate or subangulate near apex but have the inner side more or less distinctly tuberculate, the tubercles at most small. The posterior femora of both sexes are robust but rather feebly clavate. The first ventral segment is a little longer than the metasternum in both sexes and about as long as the next three ventral segments.

The principal characters separating the three subgenera are:

1. Sutural margin of elytra entire to apex.....**Donacia**  
     Sutural margin of elytra distinctly sinuate near apex.....2
2. Third antennal joint longer than fourth; head feebly constricted behind the eyes; posterior femora of male with a moderately large, acute tooth and a variable number of denticles along the inner margin, posterior tibiae feebly emarginate one third from apex, feebly tuberculate within the emargination; posterior femora of female mutic, posterior tibiae not emarginate near apex but feebly tuberculate near the inner margin. Vaginal plates of the female equal, subtruncate or feebly emarginate at apex, both plates of equal size, that is, the lower one not longer and not produced into a sharp point at middle.....**Pæcilocera**
- Third antennal joint shorter than fourth; head strongly constricted behind the eyes; posterior femora of male with a single distinct tooth and no denticles; posterior tibiae not emarginate near apex and without denticles in either sex. Vaginal plates of the female subequal; the upper one narrower and shorter than the lower one, the latter produced at middle of apex into a more or less sharp point, the edges either very finely or coarsely serrated .....**Plateumaris**

<sup>1</sup> Mr. Leng in his revision attributes this character to *distincta* also but I am unable to see it in any of the numerous specimens which I have examined.

The vaginal plates of the females of the species of the subgenus *Plateumaris* are easily seen and generally protruded and are different from the species of the other two subgenera as far as I was able to see them without dissection. The lower plate is much longer than the upper and more or less obliquely narrowing to apex into a sharp point, the sides rather sharp or finely and sometimes coarsely serrate which would indicate that it is used as an ovipositor or rather a tool to make slits in stems of plants in which the eggs are deposited; also a different way of oviposition than those of the other species of *Donacia* which have the plates similar to those of the females of the subgenus *Pacilocera*, described in the table. If the vaginal plates are similar in structure in all the species of the subgenus *Donacia* it would perhaps be justified to give *Plateumaris* generic standing as is done in Europe. However, in a female of *pubicollis* the apex of lower plate protrudes very faintly but seems to be sharply pointed.<sup>2</sup>

***Donacia proxima* Kirby.**

var. *episcopalis* Lac.

var. *californica* Lec.

*Donacia proxima* should perhaps be listed as more than a var. of *cincticornis*, though it is more closely related to the latter than to any other species. *D. cincticornis* has always much longer femora than *proxima*, which in the male reach beyond the apex of the elytra, while in *proxima* they extend only to the apex of the fourth ventral segment; in the female of *cincticornis* the posterior femora extend to the apex of the fourth ventral segment, in *proxima* to the third, the prothorax is more transverse and the outer apical angle of elytra is generally broadly rounded in *proxima*.

I have a few specimens from N. Y., N. J. and Pa. which agree closely with Lecordaire's description of *D. episcopalis*. It is placed as a synonym of *proxima* but while closely related it seems entitled to be recognized as a var. of *proxima*. It is always smaller, the pro-

<sup>2</sup> While this paper was in the hands of the printer, Mr. Schwarz in a letter called my attention to his paper on the ovipositor of the females of the subgenus *Plateumaris* published in Proc. Ent. Soc. Wash. vol. III, p. 24, where figures are given of the ovipositor of three different species. Fig. a, is what I described further on as *D. serricanda* and the form of ovipositor is unique as well as that of *D. rufa* (fig. b), the rest of the species have an ovipositor similar to *D. emarginata* (fig. c).

thorax less transverse and more or less distinctly, though finely, alutaceous and often with exceedingly fine undulating rugæ on the disk; the third antennal joint is generally relatively longer than in *proxima*. It superficially resembles *cincticornis*, but the color of the upper surface seems to be generally blue or blackish blue as in *proxima*, and the prothorax is alutaceous and somewhat dull but shining in *cincticornis*, the posterior femora of both sexes are as in typical *proxima*; that is, shorter than in *cincticornis*.

The var. *californica* agrees in all structural characters with *proxima* but differs in having the upper surface entirely metallic green, cupreous or æneous and the elytra more coarsely and closely punctate. It seems to occur only in the West, the specimens which I have seen are from Idaho, Br. Columbia and California.

#### ***Donacia magnifica* Lec.**

This with *proxima* is made a variety of *cincticornis* but is distinct from either and should be given specific standing. The head and the eyes are relatively smaller, the prothorax is of different form and always rather coarsely punctate; the inner, smaller tooth of the posterior femora of the male, distant in *proxima* and *cincticornis*, is in *magnifica* very near and almost opposite the larger tooth and the last dorsal segment of the female is shorter and rotundate-truncate at apex.

#### ***Donacia rufescens* Lac.**

This is not a var. of *hypoleuca* Lec. but a distinct species. It is always much smaller, prothorax relatively shorter and more transverse, less distinctly alutaceous in the female, but more or less shining in the male. The elytra more or less shining in the male but distinctly alutaceous and dull in the female. The posterior femora are shorter and more strongly clavate with a relatively stouter tooth and the last ventral segment of the female is narrowly emarginate at apex. The emargination of the last ventral segment of the females of this species is unique and does not seem to occur in any of our other species. It is variable, in some specimens the emargination is deep, triangular in others faint. Fully colored females are blue or greenish blue above.

In *hypoleuca* the prothorax in both sexes is distinctly alutaceous



and dull and nearly as long as wide and the elytra are very shining in both sexes; the posterior femora of the male are moderately clavate and extending beyond the apex of elytra, in the female to the apex of the fourth ventral segment. The mesosternal process is longer and more parallel than in *rufescens* and the last ventral is feebly sinuate-truncate at apex.

*Donacia texana* Cr. is possibly also a good species and not a synonym of *hypoleuca* if my identification of a specimen from New Braunfels, Texas, as that species is correct. The third antennal joint in this specimen is decidedly shorter than in *hypoleuca* the prothorax shorter and more transverse with the posterior angles less prominent, the posterior femora strongly clavate and the legs and antennæ dark. This specimen, a male, looks superficially much like *palmata* and has the prothorax in form and sculpture very similar to that species but the posterior femora are longer, armed with a single, acute tooth and the first joint of anterior tarsi is not dilated.

***Donacia parvidens* new species.**

Female.—Moderately elongate and slightly more robust than *cincticornis*. Head and prothorax coppery bronze, elytra castaneous, shining with a more or less distinct bluish tint; underside paler than the elytra and clothed densely with short, silvery pubescence; antennæ black or piceous; all the femora pale but more or less blackish above, tibiæ more or less blackish on outside. Head feebly shining, closely punctate with moderate punctures, median line deeply impressed; antennæ moderate reaching back to about the middle of elytra, third joint shorter than first but distinctly longer than the second, fourth about as long as the first. Prothorax subquadrate, anterior angles distinct but scarcely prominent, posterior angles moderately prominent, lateral tubercles obsolete, lateral margin not narrowing from apex to about basal fourth, then rather strongly convergent to base, sides moderately constricted at middle; surface feebly shining, finely alutaceous, rather sparsely punctate with fine punctures; median line distinctly and moderately deeply impressed from apex to base, near the latter a shallow, broad depression. Elytra depressed, a little more than twice as long as wide at base; surface shining, punctures of the regular rows moderately large, intervals subconvex and scarcely strigose; apex truncate or subtruncate. Mesosternal process about as wide as long between the coxæ; posterior femora rather short, though slender, reaching to or a little beyond the apex of the second ventral segment, feebly clavate and armed below with a feeble tooth. Length 8.5 mm.

Male.—As usual with slightly longer posterior femora, the tooth a little longer, slightly longer antennal joints, prothorax a little more shining and scarcely alutaceous and mesosternal process a little narrower.

Yaphank, Lg. Isld. (female type), Lahaway and Lakehurst, N. J.

I have seen ten specimens collected by myself at Yaphank and Lahaway, by Messrs. Davis and Leng at Lahaway and at Lakehurst by Mr. Davis.

This distinct species, for which I could not find a description, is apt to be confused with *cincticornis*. However, the antennæ are heavier, the prothorax has a different shape and sculpture, the posterior femora are much shorter and have only a single, feeble tooth in both sexes, the last dorsal segment of the female is less elongate and subtruncate or broadly rounded at apex and the mesosternal process is narrower than in *cincticornis*.

***Donacia edentata* new species.**

Female.—Form depressed, nearly as in *palmata* but smaller. Head and prothorax coppery bronze, the latter distinctly and very finely alutaceous and dull; elytra shining, castaneous with a more or less distinct bluish-green, metallic tint; underside paler, femora above more or less blackish; antennæ dark above and pale beneath. Head densely punctate with moderate punctures, median line deep, without frontal tubercles; antennæ reaching backwards beyond the middle of elytra, third joint longer than second and a little shorter than fourth but about equal in length to the first joint. Prothorax slightly wider than long, sides more or less undulate; anterior angles obtuse, not prominent; lateral tubercles obsolete; basal angles moderately prominent; median line entire and deeply impressed ante-basal impression shallow; surface dull, finely alutaceous at middle, more coarsely so at sides, finely and sparsely punctate. Elytra depressed, nearly four times as long as the prothorax and a little longer than twice as long as wide at base; apical angles truncate; punctures of the regular rows moderate, intervals smooth and shining, feebly convex. Body below very finely and densely punctate and covered densely with short white pubescence. Posterior femora moderately elongate and rather feebly clavate, without tooth. Mesosternal process slightly longer than wide. Last ventral segment broadly rounded at apex; last dorsal moderately elongate, narrowing to apex, the latter narrowly truncate or rotundate-truncate. Length 9 mm.

Male.—Smaller and slightly narrower, with longer antennal joints and posterior femora, the latter also without tooth; last dorsal truncate-emarginate at apex. Length 7 mm.

Crum Lake, N. Y. (Wm. T. Davis), Centerton, N. J. (Chas. Lieback), found on *Nymphæa odorata* by Mr. Wm. T. Davis.

This species is very distinct from any other known so far. By description and superficially it resembles *parvidens* somewhat, but the

form is more elongate, the prothorax always dull, the antennal joints longer and narrower, the posterior femora in both sexes longer and without tooth. In one of the males an exceedingly small, feeble tubercle is visible on the posterior femora.

***Donacia glabrata*** new species.

Male.—General form of *subtilis* with similar prothorax, metallic green, shining, elytra without transverse rugæ on disk, prothorax with a deeply impressed median line; legs reddish, apical half or so metallic, posterior femora without tooth. Head densely punctate, punctures finer than those on prothorax; median line deeply impressed; moderately tuberculate on each side of median line; antennal joints longer and narrower than in *subtilis*; third joint shorter than in *rugosa*, though the outer joints are longer than in that species. Prothorax almost as in *subtilis*, anterior angles not prominent, obtuse, posterior angles moderately prominent; median impression wide and deep, basal impression distinct but less deep; lateral tubercles indistinct; surface rather coarsely and sparsely punctate at middle, punctures denser at apex and base and at sides more or less confluent and transversely strigose. Elytra a little more than three times as long as prothorax and about twice as long as wide at base; punctures forming the regular rows relatively large, intervals not or scarcely wider, smooth, shining and with scarcely any transverse rugæ on the disk which are present at sides and near apex, the latter rotundate-truncate. Body below moderately densely pubescent, pubescent short and white; legs reddish; femora in about apical half metallic, posterior femora moderately strongly clavate, rather sparsely punctate and without tooth; last dorsal segment emarginate-truncate at apex. Length 7 mm.

Clementon, N. J.

This species by its form resembles closely *subtilis*, from which it differs in its smooth, shining surface, longer antennal joints, bicolored, more shining and more sparsely punctate femora, the posterior one without tooth. *Rugosa* has also bicolored posterior femora, which is feebly toothed in the male, but *glabrata* is more slender, with shorter third antennal joint and all the joints black, the outer ones longer than in *rugosa*, the prothorax with very few punctures on the disk, median line deeply and rather broadly impressed, and elytra smooth, shining with scarcely any transverse rugæ on the disk.

***Donacia megacornis*** Blatchley.

This species was described from a single specimen from Indiana but I have specimens from Lakehurst, Lakewood, Pt. Pleasant, N.

Lisbon and Anglesea, N. J., and in Mr. Leng's collection are specimens from Massachusetts and Iowa.

The species is rather short, robust, not elongate and slender as Mr. Blatchley describes it; prothorax about as long as wide, tubercles at most moderately distinct; sides less narrowed toward apex than in *subtilis* and surface more coarsely punctate. Elytra with distinct impressions, the latter generally less deep than in *aqualis*; apices squarely truncate. Body beneath clothed densely with short, yellowish pubescence; the posterior femora in both sexes with a rather large, triangular tooth, which is more or less distinctly serrulate posteriorly. The antennal joints are stouter than in any other species known to me. The last dorsal segment is emarginate-truncate at apex in the male and broadly rounded in the female.

I have seen the type of this species, which Mr. Blatchley kindly sent me for examination.

**Donacia liebecki** new species.

Female.—Similar in form to *megacornis* but less convex, antennæ less stout, elytral impressions more feeble and posterior femora with a small, sharp tooth in both sexes. Head densely punctate, punctures much smaller than those on prothorax; median line deeply impressed; frontal tubercles obsolete; antennæ annulate, rather short, not extending to the middle of elytra, second and third joint short, equal, fourth a little longer than third. Prothorax as wide as long, not or at most feebly narrowing to base; anterior and posterior angles distinct and feebly prominent; lateral tubercles obsolete; sides feebly undulate; median line and basal impression feeble; surface sculptured as in *subtilis*. Elytra about three and one half times as long as prothorax and about twice as long as wide at base; apices sharply truncate; punctures of the regular series moderately large; intervals moderately coarsely rugose. Body beneath densely and finely punctate and moderately densely clothed with short yellowish-white pubescence; mesosternal process longer than wide at apex; legs reddish, posterior femora moderately clavate and armed with a small acute tooth. Last dorsal segment emarginate at apex. Length 7.25 mm.

Male.—Narrower than the female with longer antennal joints and last dorsal segment broadly emarginate, posterior femora with a small, acute tooth.

Wyandanch, Lg. Isld.; Lakehurst and Malaga, New Jersey.

I have seen eleven specimens collected on Long Island and at Lakehurst, N. J., by Messrs. Davis, Schott and myself, and the specimens from Malaga, N. J., were received from Mr. Chas. Liebeck,

whose name I have given it in recognition of many favors received. It resembles *megacornis* more than any other of our species but differs from that by more depressed form, less stouter antennal joints, posterior femora moderately clavate with a small acute tooth in both sexes and mesosternal process a little narrower.

The males look much like very small females of *subtilis*, but have shorter antennæ, a little more convex and shorter form, reddish legs, narrower and more elongate prothorax and more prominent eyes. If compared with the males of that species the differences are obvious enough.

***Donacia tuberculifrons* new species.**

Female.—Oblong-oval, shining, æneous, feebly depressed. Head densely punctate, punctures smaller than those on prothorax; median line deeply impressed; frontal tubercles very distinct; antennæ black; scarcely reaching to the middle of elytra, second and third joints small, the latter a little longer than the former, fourth subequal to second and third together. Prothorax about as wide as long; anterior angles distinct, not prominent, posterior angles prominent; anterior tubercles nearly obsolete; sides feebly narrowing to base and scarcely undulate; median line distinct; basal impression feeble; surface moderately coarsely punctate; punctures well separated on the disk, more crowded near the impression, at apex and at sides, confluent at the latter and strigose. Elytra about three and one half times as long as the prothorax and about twice as long as wide at base; punctures of the regular series moderately large; intervals rather feebly transversely rugose on the disk; apices truncate; last dorsal broadly rounded. Body beneath densely and finely punctate and clothed with very short white pubescence, which does not obscure the æneous surface color. Legs æneous, posterior femora moderately clavate and armed with a small tooth. Mesosternal process narrow, a little longer than wide. Length 8 mm., width, across base of elytra, 3 mm.

Male.—Slightly narrower, tooth of posterior femora a little longer, last dorsal segment feebly emarginate-truncate.

Toronto, Canada, (type) Northern Illinois.

The Toronto specimens I owe to the kindness of Mr. Chas. Liebeck.

This species is of more robust form than either *subtilis* or *distincta* with different prothorax and shorter antennæ. It has the antennæ similar to *liebecki* above described but the head in the latter is strongly constricted behind the eyes, which are much more prominent than in *tuberculifrons*, which has the prothorax more convex and shining and the intervals of the elytra are feebly rugose on the disk, the posterior

femora rather feebly clavate and longer, reaching to or slightly beyond the apex of the fourth ventral, in *liebecki* to about the third ventral segment.

***Donacia distincta* Lec.**

I can not convince myself that the specimens under that name in every collection I have seen are the true *distincta*, including the specimen sent me by Mr. Frost and compared by him with the type, a so-called homotype. They do not agree with Leconte's group characters. Leconte places *distincta* and *hirticollis* in a separate group defined as follows: "Crassiusculæ, elytris apicem versus magis angustatis, thorace punctato tuberculatoque, elytris valde rugosis, antennis minus elongatis, articulo tertio secundo paulo brevior." Taking *hirticollis* as guide, the shorter, more robust form, the elytra more strongly narrowing towards apex and the shorter antennæ are evidently the principal characters of the group, but which scarcely could be applied to these so-called *distincta*. Leconte under his description of *distincta* also says "habitus fere *D. proxima*" but the two are certainly widely different in form. The type specimen of *distincta* came from Lake Superior and ought to be still in Leconte's collection.

Mr. Leng was correct when he stated that he was unable to separate *torosa* Lec. from these so-called *distincta*. The color varies in these and the sculpture of the prothorax is much more variable than in any other species of the subgenus *Donacia*. I have seen over fifty specimens of this from various localities ranging from Massachusetts to Florida. The prothorax may be more or less densely punctate with rather coarse punctures which are sometimes more or less transversely confluent, especially laterally or very finely and sparsely punctate with more or less distinct and very finely impressed wavy lines. The two extremes look certainly distinct from each other but intermediate forms are there which prohibit the establishment of even a variety. The color of the antennæ, the relative length of the joints, especially the second and third, and the distinctness of the frontal tubercles is also variable. I have a specimen which is black above with antennal joints red except the first, which is metallic. As already stated elsewhere the sinuation of the sutural margin of the elytra near apex, mentioned by Mr. Leng in his revision, I am unable to see in any of the specimens examined.

***Donacia tuberculata* Lec.**

This species has the head behind the eyes a little more constricted than in *harrisi* but less so than in any of our other species. The smaller eyes of *harrisi* mentioned by Leconte and others as a peculiar character is shared by other species of both subgenera but with the exception of *tuberculata* the head in these is more strongly constricted behind which gives them a more prominent appearance.

***Donacia harrisi* Lec.**

It may be of interest to those using Mr. Blatchley's Coleoptera of Indiana to know that the species identified there as *harrisi* is not that species. It is a new species belonging in the subgenus *Plateumaris*. In reading over his description and remarks on that species I received the impression that this species is much more variable than known and asked Mr. Blatchley for the loan of a few specimens. He kindly sent me a single specimen, all he had, which proved to be as stated above.

***Donacia pusilla* Say.**

As defined by Mr. Leng in his revision a number of more or less distinct forms are included under this name.

Of the true *pusilla* I have specimens from New Foundland, Maine and Massachusetts. These have the second and third antennal joints subequal in length, the fourth a little longer than third, the outer four or five joints very distinctly wider than the preceding joints, especially in the male, the elytral indentations generally deeply impressed, the posterior femora moderately closely punctate and armed with a rather small tooth. There is another eastern species which I find generally mixed with this and which probably is *dives* Lec., placed as a synonym of *pusilla*. These have longer antennal joints and the outer four or five are scarcely wider than the preceding; the prothorax is similar, but generally a little wider; elytra with feeble indentations and generally more densely punctate and rugose; the posterior femora are stouter, closely punctate and armed in both sexes with a rather large, triangular tooth. The legs in both are red, femora with or without metallic space near apex. Certain *emarginate* with rugose prothorax and median line very feeble may cause trouble as to their correct place, but these have generally a still larger tooth on the

posterior femora, which latter is always uniformly metallic, at least in all the numerous specimens which I have examined, the prothorax is slightly longer, with distinct anterior tubercles and the head behind the eyes is more deeply constricted with a narrower neck.

I have seen specimens of what I consider to be *dives* Lec. from New Foundland, Maine, Connecticut, New York and New Jersey.

The western specimens from Cal., Oreg., etc., which are probably *pyritosa* Lec. do not seem to differ very much from typical *pusilla*.

***Donacia pusilla* var. *robusta* new var.**

Female.—More robust and much larger than typical *pusilla*; antennæ annulate, similarly formed; prothorax wider and less distinctly narrowed to apex and rather more coarsely rugose; elytral indentations less pronounced; legs reddish, posterior femora with a small tooth. Length 7 mm., width 3.2 mm.

Como, S. Wyoming.

Paratype in coll. C. W. Leng.

This form looks very distinct from typical *pusilla* but I am unable at present to find a strong enough character to give it specific standing.

***Donacia femoralis* Kirby.**

This species was described from Nova Scotia but Mr. Leng in his revision gives only Washington and Vanc. Isld.

I haven't seen anything from the East which fit Kirby's description except *metallica* and it is possible that the two are the same. Specimens from California, Washington, Br. Colombia, etc., standing under that name are possibly *germari* placed with *flavipennis* as synonym of *femoralis*. The descriptions of *germari* and *flavipennis* are so poor that it is impossible to identify them and I have seen no specimens from Alaska, the type locality for both.

***Donacia serricauda* new species.**

Female.—Cupreous, form nearly as in *flavipes*, antennæ black, reddish at base; legs reddish, femora with a more or less distinct metallic cloud. Head densely punctate and sparsely pubescent; median line deep; frontal tubercles absent; ocular orbits absent; antennæ extending back to about basal fourth, second joint shorter than third, the latter about as long as the basal joint, fourth joint a little longer than third, outer joints scarcely wider than the preceding. Prothorax as wide as long; narrowing towards base; anterior



angles distinct and moderately prominent; anterior tubercles distinct; sides feebly undulate; surface slightly uneven; median impression absent; basal impression distinct; surface alutaceous and finely and rather sparsely punctate; punctures more dense at middle and larger at apex and base. Elytra about three times as long as the prothorax and a little more than twice as long as wide at base; punctures of regular series moderate, intervals rather feebly rugose on the disk, more distinctly so at sides and apex; sutural margin near apex sinuate; apices separately rounded. Body beneath cupreous; thinly clothed with short, cinereous pubescence; posterior femora with a moderate, triangular tooth. Apex of the lower vaginal plate relatively coarsely serrate. Length 7.25 mm.

Male.—Differs only in being narrower with slightly longer antennal joints; tooth of posterior femora scarcely larger than in the female.

The type is from Stephenville, New Foundland, collected by George P. Engelhardt. It is taken in Maine by Mr. C. A. Frost and I have also a specimen from Montana, British Colombia and Wyoming and Mr. Davis has taken a specimen in Lakehurst, N. J. A very distinct species by its form and sculpture of prothorax and the only species known to me which have the lower vaginal plate of the female coarsely serrate at apex. In all the other species the serration is either absent or very fine.

***Zeugophora neomexicana* new species.**

Black; head, prothorax and legs reddish-yellow; outer joints of antennæ piceous or black. Head moderately densely punctate. Prothorax more sparsely punctate than the head; lateral tubercle moderately prominent, lateral margin above the tubercle straight, not obliquely narrowing to the apical angles. Elytra sparsely pubescent; punctures larger than those on the pronotum, well separated on the disk, closer at sides. Length 3 mm.

Santa Fe, New Mexico.

In most of the specimens of the small series before me the head above is a little darker than the prothorax and in two, from the same locality, is black above.

This species is probably mixed with *scutellaris* or those with the head black above with *consanguinea*. But *scutellaris* has a wider prothorax with the lateral tubercles more prominent, the lateral margin above the tubercles narrowing slightly to the apical angles which latter are indistinct and slightly rounded; the antennal joints are a little heavier and the size is generally larger. From *consanguinea* it differs in having the lateral tubercle of prothorax distinct,

that is, the lateral margin is straight from the base of the tubercle to the apex while in *consanguinea* the lateral margin is narrowing obliquely from the tubercle to the apex.

***Lema arizonæ* new species.**

Very near *L. texana* Cr. in form and color, except mouth parts, mesosternum, side pieces of metasternum and legs black. Head sparsely punctate, frontal tubercles obliterated; median groove short and not very deep, terminating in a rather deep fovea. Prothorax in sculpture and form as in *texana* Cr. Scutellum slightly subquadrate and emarginate at apex. Elytra blue with ten regular rows of rather coarse punctures, the punctures a little smaller towards apex; intervals smooth. Abdomen finely and densely punctate; clothed with short, greyish-white hairs; posterior femora extending to the apex of the third ventral segment and slightly more incrassate than in *texana* Cr. Length 5.25 mm.

Huachuca Mts., Arizona.

*Lema longipennis*, Linell, to which this species also seems to be allied, has the underside of body and head black and an elongate scutellum with the apex rounded.

***Lema equestris* Lac.**

Lacordaire's description of this Mexican species agrees fairly with those specimens of the variable *L. balteata* Lec., which have the prothorax red, to which I have already called attention in Science Bull. Mus, Brookl. Inst. Arts and Sciences, vol. I, p. 169. *L. balteata* has the head, prothorax, legs and underside black, abdomen flavous, elytra blue with a large, yellowish or reddish-yellow, transverse fascia as in *L. solani*, the lateral margin is blue but always interrupted by the transverse fascia. The transverse fascia is generally broad but I have specimens with very narrow fascia and one specimen with an indistinct fascia on one side and without fascia on the other side. A number of my specimens have in addition to the transverse fascia either one or two yellow subapical spots on each elytron. These subapical spots are of variable size and are coalescent in some specimens, forming a slightly arcuate subapical fascia. The specimens with red prothorax, of which I have taken only a very few, generally have the subapical fascia distinct. In about three of my specimens the prothorax is black with apex and base more or less red, these are intermediate between those with red and black prothorax.

All the different color forms are often found together on the same plant and interbreed. I have taken a male with red prothorax in copula with a female with black prothorax.

If Lacordaire's *equestris* should prove to be the same as *balteata* the latter name becomes a synonym.

**Lema opulenta** G. & H.

*Lema ornata* Baly.

*Lema lebioides* Linell.

In Proceedings of the U. S. Nat. Mus., vol. XX, p. 474, Linell described *L. lebioides* from a single specimen taken by Prof. Townsend in Brownsville, Tex. I have taken a moderately large number of this species near Brownsville, Texas, but I am unable to find anything in Baly's description of his *ornata* to differentiate the two. The head and prothorax may be entirely reddish or more or less black or piceous; the lateral vitta of each elytron is internally dilated at its posterior end but does never extend to the apex nor does it unite with the common sutural spot at the extreme apex. The dilated portion of the vitta sometimes extends to the suture or the vitta may be broken up into two spots, one linear, humeral, and a larger, rounded spot a little below middle, the spot at the extreme apex and the elongate, sub-scutellar spot seem to be quite constant.

This species is figured in Biol. Cent. Am. Col., vol. VI, pt. I, pl. I, fig. 3, as *L. ornata*; a name preoccupied in the genus and changed to *opulenta* by Gemminger and Harold.

**Lema confusa** Chev.

var. *trabeata* Dej.

var. *omogera* Horn.

Horn's *omogera* is the extreme variation of the variable *confusa*.

Typical *confusa* are black, elytra yellow, an entire sutural stripe, confluent with an internally oblique, common, apical spot, and a sub-marginal vitta, abbreviated at apex and base, black. This has been taken at Enterprise and Crescent City, Florida, by Messrs. Hubbard and Schwarz and at Biscayne Bay, Florida, by Mrs. A. T. Slosson.

The variety *trabeata* has the elytra black with a large subtriangular basal spot, a subapical oblique fascia and lateral margin, which is confluent with the basal and subapical spot, yellow. I have taken this form in Arizona (Huachuca Mts.) and have also a specimen

from Venezuela, collected by George K. Cherrie. In this and the next form the elytra may be black or bluish.

The variety *omogera* is black with a subtriangular yellow basal spot which extends along the base to the lateral margin, the latter is never entirely pale, but black in about apical half or more. As far as known this occurs only in Lower California.

***Lema notativentris* new species.**

Similar in color, form and sculpture to *nigrovittata* Guer. but the lateral black vitta of each elytron is not situated close to the lateral margin but between the sixth and eighth dorsal row of punctures; the black thoracic spot is situated in the lateral depression and scarcely visible from above; head black, also upper edge of femora, tibiae and tarsi; prosternum largely, mesosternum and metasternum entirely black; abdomen pale except a rounded, black spot, situated at middle of the basal margin of the first four ventral segments. Length 5.5 mm.

Huach. Mts., Arizona.

This species looks superficially so much like *trilineata* or the less heavily marked forms of *nigrovittata* that I did not recognize it in the field and only lately, in going over some unmounted material I found a few specimens pasted on cards with specimens of *nigrovittata* from the same locality.

***Anomœa nitidicollis* new species.**

Above reddish-yellow, elytra with suture, a common post-median sutural spot, an elongated spot on lateral margin about middle and lateral margin, from about middle to apex, black; legs, meso and metasternum black. Head smooth, shining, without punctures and scarcely rugose in front. Prothorax strongly transverse; lateral margin arcuate, gradually narrowing to apex from a little below middle to apex; apical and basal angles, the latter more strongly, rounded; surface very shining and impunctate. Scutellum black, with a few moderately coarse punctures and fine pale hairs in basal half. Elytra less shining than the prothorax, sparsely punctate, punctures confused but showing a tendency to become regular, especially near suture; metasternum and abdomen finely and moderately closely punctate and closely pubescent with greyish-white hairs. Length 9.75 mm.

Texas.

A single specimen, a female, in the Dietz collection which probably came from New Braunfels, Tex.

The smooth, very shining head and prothorax, the more elongate

form and the different coloration of the upper surface separates this principally from females of *mutabilis*. Of the latter I have quite a number of specimens from Brownsville and New Braunfels, Texas, but while the males are very variable in coloration, the females vary very little and have the prothorax always more or less dull.

***Anomœa mutabilis* Lac.**

I have taken this species in Brownsville, Tex., and have it also from New Braunfels. The males are very variable in coloration. Specimens occur which nearly agree with the description of *A. rufifrons* Lac. and I believe that the two are the same species. The most extreme variation I have seen has the prothorax and head fulvous the latter with the space behind the eyes and the occipital spots black, legs pale, except the tarsi and front tibiæ; elytra ochraceous with suture, a median marginal blotch and an elongate discal spot about middle of each elytron black.

***Anomœa högei* Jac.**

In Science Bull. Mus. Brookl. Inst., vol. I, p. 229, I reported the occurrence of this Mexican species in our fauna of which I had two males and three females from New Braunfels, Texas, and have since seen more. Mr. Jacoby described it from one male and three females and distinguishes this from the other species of the genus mainly "by the absence of any dark markings above, the whole upper surface being fulvous." My two females agree exactly with his description but in one of the males the abdomen is black at sides and in the other entirely black, the scutellum in the latter is also black but at apex pale. The males have the front tibiæ near apex more strongly curved than in *mutabilis* and *laticlava* and the antennal joints in both sexes are more transverse and stronger serrate than in the latter species.

***Anomœa (Gynandrophthalma) arizonica* new species.**

Moderately elongate, nearly parallel; shining, black, underside of anterior tibiæ and tarsi, first three antennal joints and labrum pale; prothorax with an obscure reddish cloud on the disk; elytra blue with a relatively large red basal spot, as in *Saxinis omogera*. Head between the eyes at middle with a more or less distinct rounded impression; shining and feebly punctate on the occiput, otherwise somewhat rugose and more coarsely but sparsely punctate; antennæ serrate from the fourth joint, the serrate joints transverse. Pro-

thorax about twice as wide as long, sides feebly arcuate; posterior angles broadly rounded, anterior angles indistinct, rounded; disk slightly uneven, punctuation very fine and with some coarser punctures at sides and anteriorly intermixed. Elytra moderately coarsely and irregularly punctate; punctures near apex more or less obliterated; intervals very finely punctulate. Under-side moderately densely clothed with white hairs. Length 4.5 mm.

Huachuca Mts., Arizona.

This species varies a little. The front tibiae are occasionally entirely black; the prothorax black or with more or less distinct, though obscure reddish patches; the lateral elytral red spot, which never extends down as far as the middle, is towards its apex more or less dilated and extends in some specimens to the suture, but leaving the scutellar region dark blue.

This is possibly only a local form of *A. militaris*, Lec., but it is of a little more elongate form and without the red apical spot on each elytron. I have seen about eighteen specimens but while the red humeral spot is very variable in size in none of these is any indication of an apical spot.

*Anomæa humerigera*, described from a single female from Mexico by Lacordine, seems to be very close to this, but the elytra in the Arizona specimens are not finely alutaceous. *A. arizonica*, and very likely *militaris* and *humerigera*, possibly belong in Lacordarie's subgenus *Gynandrophthalma* as the two sexes are nearly alike. In the subgenus *Anomæa* the males generally differ very much from the females in the form of head, prothorax, elytra, anterior tibiae and often greatly in coloration.

#### ***Chlamys memnonia* Lac.**

In Proc. U. S. Nat. Mus., vol. XX, p. 476, Mr. Linell deals at length with this species, which he recorded from Brownsville and San Diego, Texas, and from southern Arizona. From his remarks it is evident that the Arizona specimens differ from those taken in Texas but he was unable to find any specific characters to separate them and considered them all one variable species.

I have this species from Brownsville and New Braunfels, Texas, and have also taken specimens in the Huach. Mts., Ariz. However, the specimens from Arizona differ sufficiently from those taken in Texas to entitle them to a name.

***Chlamys confusa* new species.**

Similar in form, color and sculpture to *memnonia* Lac. but the elytral tubercles and ridges are less strongly developed, the prothoracic crest is lower and less deeply impressed, the true scutellum narrower and the second, or metascutellum, rarely as distinct as in that species and sometimes absent. At the bottom of the emargination of the eyes is an orange-yellow spot as in *plicata* and *tuberculata*, which is absent in *memnonia* and *prosternalis*. Length 4 mm.

Huachuca Mts., Arizona.

Besides the less developed elytral tubercles and ridges the small, yellow spot inside of each eye separates this species readily from *memnonia*.

The elytral sculpture varies to some extent but is in the largest specimens never as strongly developed as in typical *memnonia*. It is possible that this species is the same as *mastifica* Lac., which was described from specimens from Mexico and also two from California. However, none of my specimens do exactly agree with Lacordaire's description of *mastifica*.

In Biol. Cent. Am., Col. vol. VI, pt. I, p. 75, Mr. Jacoby places *Chlamys memnonia* rather doubtful in the genus *Diaspis*. The principal characters of this genus are the possession of a second scutellum, termed by Lacordaire the metascutellum, and the bifid claws. In *C. confusa*, the second scutellum is almost absent or very faint in a few specimens and Linell mentions a specimen of *C. plicata* with a second scutellum so this character becomes valueless and there remains only the bifid claws. These are in *memnonia*, *confusa* and *prosternalis* broadly appendiculate at base as in *plicata* and these species cannot be placed properly in *Diaspis*.

***Urodera texana* new species.**

Rather shortly oval, black, elytra reddish-yellow, except suture margin narrowly and an oblique, arcuate median band black. Head nearly smooth with only a few small punctures which are near the eyes larger. Prothorax about one and one half times as wide as long; median basal lobe not reflected; surface sparsely and rather finely punctate. Scutellum smooth. Elytra with rows of rather fine punctures; intervals smooth, except for a few very small adventitious punctures. Underside and pygidium rather closely punctate and covered moderately densely with short greyish-white hairs. Length (from apex of prothorax to apex of elytra) 6 mm., width 4.25 mm.

Brownsville, Texas.

This species differs from *crucifera* Lac., that is, the North American specimens identified as that species, in being shorter and consequently more robust, the prothorax though finely but distinctly punctate, the median basal lobe of prothorax not at all reflexed, more or less distinctly so in the specimens of *crucifera* collected by myself and others in Arizona, and the epipleural lobe is more subangulate.

***Cryptocephalus pinicolus* new species.**

Narrower and a little more elongate than *quadrимaculatus* Say, prothorax distinctly dark metallic blue, elytra black with a bluish tint, an elongate humeral spot, extending inwardly to the fifth or sixth dorsal stria and a subapical spot red. Head sparsely punctate with moderate punctures; antennæ as in *quadrимaculatus*. Prothorax rather finely and sparsely punctate, punctures larger near base. Elytra not as coarsely punctate as *quadrимaculatus*; intervals smooth. Pygidium coarsely and rather densely punctate with a more or less distinct median carina. Abdominal segments two, three and four closely and moderately coarsely punctate, each puncture bearing a very short, pale hair. Last ventral segment of the female with a very large, deep, circular fovea. Length 3.5 mm.

Huachuca Mts., Arizona.

Two of the few specimens are marked "beaten from pine." The narrower and relatively more elongate form and the distinct dark metallic blue color will separate this from *quadrимaculatus* or *quadru-plex*. Specimens of *quadrимaculatus* especially those from the South have at least the prothorax more or less blackish blue, but the form of these is more robust and the elytral punctuation is more coarse. The apical read spot is absent in one specimen.

***Cryptocephalus pubiventris* new species.**

Similar in coloration to *C. quadrимaculatus* var. *notatus* Fab. but much larger. Head closely punctate with moderately large punctures, median line without punctures. Prothorax less transverse and relatively a little longer than in the var. *notatus*; distinctly punctate, but punctures not close and moderately large. Elytra with rows of moderately large, not closely placed punctures. Underside densely punctate, except the first ventral segment on which the punctures are less dense than on the following segments, clothed with relatively long greyish white pubescence. Length 6 mm., width, across the middle of elytra 3.25 mm.



Huachuca Mts., Arizona.

The color is black, except the first four or five antennal joints, and the red markings are as in *quadrinotatus* var. *notatus*, but the size is much larger, relatively narrower and a little more elongate, with prothorax less transverse and the underside relatively densely pubescent with rather long hairs.

***Cryptocephalus guttulatellus* new species.**

*Cryptocephalus quatuordecimpustulatus* Schaef. nec Suffr.

Shining, flavous, prothorax a little darker, except a pale transverse basal fascia not reaching the middle nor the sides; elytra marked with longitudinal and transverse pale brown lines as in *guttulatus* Oliv. Head almost smooth, only a few sparse frontal punctures; antennæ with the last three or four joints darker. Prothorax relatively less convex than in *guttulatus*, smooth, with at most a few very small punctures. Elytra rather feebly impressed below the subhumeral umbone; striæ as in *guttulatus*, here and there feebly impressed, punctures moderate. Pygidium coarsely and moderately closely punctate, with at most a few scattered, short hairs. Length 2.75 mm.

Brownsville, Texas.

In Journ. N. Y. Ent. Soc., vol. XII, p. 226, I reported this species as the Mexican *14-pustulatus* Suffr. which is a much larger insect. The above described species is about the size of *ocellatus* Suffr. and similarly marked but the color of the head and prothorax is not "rostrath" and the pygidium is not finely punctate and pubescent.

***Metachroma texanum* new species.**

Oblong, shining, rufocastaneous, elytra, except suture, legs and antennæ paler, the apical joints of the latter infuscated. Head coarsely punctate on occiput and clypeus, faintly and more sparsely at middle; frontal impression rather feeble; clypeo-frontal suture obliterated. Prothorax wider than long; sides rather strongly arcuate; apical and basal angles prominent; surface with moderately large punctures which are coarser at sides but finer near apex and base. Elytra slightly longer than wide at middle, with regular rows of rather coarse punctures, which are finer towards apex and base; the two short striae, external to the seventh, absent; intervals smooth. Body beneath sparsely punctate; propleurae at base with a few punctures; met-episterna almost smooth; posterior femora with a small tooth on the lower edge. Length 3 mm.

Brownsville, Texas.

This and the following new species are distinguished from all our species with a denticle on the lower edge of posterior femora by the

absence of the two short striæ. Dr. Horn in Trans. Am. Ent. Soc., vol. XIX, p. 211, says that the species of this genus have eleven striæ on each elytron, seven between the suture and the umbo and two parallel with the side margin. Between these two series, just exterior to the seventh, are two short striæ, which may be regular or confused. Dr. Horn evidently did not count the short scutellar nor the marginal stria. With a few exceptions the stria next to the marginal one is rarely entire, it generally joins the marginal stria about middle or the basal part a little above middle and the apical part a little below middle.

**Metachroma novemstriatum** new species.

Oblong, shining, above yellowish-testaceous, prothorax a little darker; each elytron with two darker spots, one above middle, between the fourth and fifth striæ, the other below middle and between the sixth and seventh striæ; body beneath dark brown; antennæ pale. Head sparsely punctate, occiput more coarsely punctate; clypeus moderately coarsely punctate; frontal impression distinct; clypeo-frontal suture obliterated. Prothorax a little wider than long; sides moderately arcuate; apical and basal angles prominent; surface moderately coarsely punctate, punctures finer near apical, lateral and basal margins. Elytra a little longer than wide across the middle; striate-punctate, striæ regular, short striæ absent; intervals very feebly punctate. Propleuræ without punctures. Body beneath sparsely punctate; met-episterna smooth; posterior femora with a very small denticle. Length 3.75 mm.

Lower California (G. Beyer).

**Colaspis subænea** new species.

Form and size of *C. brunnea*; shining; upper surface brown with distinct metallic tint; below and legs slightly paler, except metasternum, which is darker and with metallic tint; labrum, palpi and antennæ flavous, the seventh, tenth and eleventh joints of the latter black. Head rather sparsely, not coarsely punctate; epistoma more coarsely and closely punctate. Prothorax moderately closely punctate at sides, punctures finer on the disk, sides feebly arcuate from base to a little above middle, then more strongly narrowing towards apex; apical angles obtuse; basal angles prominent. Elytra scarcely wider at base than the prothorax; punctuation coarse and rather confused in about basal half; more regular from the middle towards apex where the intervals are more or less distinct and subcostate near apex; sutural angles acute, slightly prominent. Propleuræ, metasternum and ventral segments sparsely punctate. Length 4 mm.

Brownsville, Texas (O. Dietz).

This species differs from *brunnea* and varieties in having the upper surface shining and dark with distinct metallic tint and the intervals scarcely raised, except at apex. A specimen taken by myself at the same locality in August is apparently partly immature and has the elytral punctuation finer than in the type specimen.

***Colaspis brunnea* var. *viriditincta* new var.**

Form and size of *C. brunnea*; head and prothorax metallic green and cupreous; elytra yellowish testaceous, scutellum, base narrowly, lateral margin, and generally the punctures metallic green; abdomen beneath with metallic tint; legs flavous, hind femora black at tip; palpi and antennæ flavous, except the seventh and the two last joints, which are black. Head relatively more closely punctate than in var. *costipennis*; punctures at sides above the eyes more or less confluent. Prothorax as in var. *costipennis*. Elytra with seven, more or less distinct costiform intervals. Length 4.5 mm.

Douglas, Arizona (F. H. Snow).

This form differs from var. *costipennis*, which also has a bright metallic head and prothorax, in having seven, more or less distinct elytral costæ.

***Nodonota texana* new species.**

Oblong, bronze, surface alutaceous and moderately shining. Head moderately coarsely punctate, punctures a little finer and sparser above; clypeus not contracted. Antennæ rufo-testaceous, the outer joints piceous at apex. Prothorax a little more than twice as wide as long, sides arcuately narrowing from base to apex; basal and apical angles subacute; surface very distinctly alutaceous and moderately coarsely punctate, punctures scarcely denser at sides than on disk. Elytra irregularly punctate; punctures a little coarser than on the prothorax, but gradually finer towards apex, where they are less confused; umbo prominent and prolonged posteriorly with a distinct impression internally. Body below alutaceous; propleuræ sparsely punctate; abdomen sparsely punctate. Legs rufo-testaceous. Length 3.25 mm.

Brownsville, Texas.

I have taken only a single specimen, a female, of this species, which I had placed doubtfully with *puncticollis*. It is, however, narrower, more elongate and less convex than the latter and the punctures of the prothorax are not substrigose. Another specimen, without tarsi, is in the Dietz collection from "Texas," which is probably a male. It is a little more shining, prothorax more finely alutaceous and the umbo, though moderately prominent, is not prolonged posteriorly.

**Melasoma (Lina) californica** Rog. and **arizonæ** Cr.

The following new genus is proposed for the reception of these two species which do not belong in the genus *Melasoma* (Lina), where they are placed in our list. They look, in fact, out of place there.

**Pseudolina** new genus.

Differs from *Melasoma* (Lina) in having the prothorax arcuately narrowing from base to apex, without longitudinal lateral impression; the sides of prothorax and elytra not thickened; metasternum broadly arcuate in front, not produced between the middle coxæ and the tibiæ are not grooved externally, except more or less distinctly at tip.

Type *Plagioderia californica* Rog.

*Plagioderia*, to which this new genus is also related, has the metasternum distinctly produced between the middle coxæ as in *Melasoma* and the elytral epipleuræ are deeply, longitudinally excavated. *L. arizonæ* Cr., which occurs also in Mexico, is placed in the genus *Plagioderia* by Mr. Jacoby.

**Melasoma tremulæ** Fab.

The North American specimens identified as *M. tremulæ* Fab. are in my opinion *M. saleceti* Reit. At any rate they seem to agree with the description of the latter species better than with the description of *M. tremulæ*.

**Melasoma immaculata** new species.

Ovate, shining; elytra luteous, immaculate; scutellum, prothorax at sides pale yellow, at middle and head black with faint metallic tint; antennæ pale, first and outer four joints darker; underside pale, except metasternum, a transverse fascia on each ventral segment, which is broadly arcuate at middle, femora, except at base, and apex of tibiæ black with more or less metallic green or blue tint. Head broadly impressed at middle; finely, not closely punctate, with sparser larger punctures intermixed. Prothorax about twice as wide at base as long, sides gradually narrowing from base to a little below apex, then arcuate to apical angles, which are rounded; basal margin distinctly bisinuate; apical margin broadly, rather deeply emarginate; surface on the disk finely punctulate with some sparser, larger punctures intermixed; laterally relatively coarsely punctate, the punctures in the lateral impression rather crowded. Scutellum smooth, shining. Elytra irregularly punctate, punctures not coarse; the thickened lateral margin smooth. Ventral segments with transverse row of punctures near apex, at sides more or less finely, transversely rugose. Length 5.25 mm.

Washington.

I have also specimens from British Columbia collected by the late J. Chr. Weidt. Two of the specimens from the latter locality are dark brown with faint metallic tint and differ from *confluens* with uniformly colored elytra in less elongate form and bicolored ventral segments and legs. *M. obsoleta* has always a pale lateral margin and the ventral segments dark metallic hue, the last segment at apex and sides and the penultimate at sides pale.

**Melasoma obsoleta** Rog.

This is a variable species. The darkest forms have the elytra black or purplish black with pale lateral margin and the extreme palest form has the elytra flavous with markings like *scripta* with which specimens of the latter form are found in collections. Intermediate forms between the two, elytra black with more or less distinct pale spots, or the elytra pale with the dark spots and lines more or less confluent are found together with the two extreme forms mentioned above. *M. obsoleta* is relatively shorter, more convex and has the prothorax more transverse than *M. scripta*.

**Melasoma scripta** var. **texana** new var.

Form, size and coloration generally like typical *scripta*, but prothorax, elytra and epipleura relatively more coarsely punctate. Head and prothorax pale ferruginous with a faint metallic tint; the median part of prothorax sometimes darker, but apparently never as decidedly metallic green as in typical *scripta* or the maculate specimens of the var. *confluens*. Underside pale ferruginous with metallic tint, sometimes abdomen and sides of metasternum more or less metallic green. Legs pale with faint metallic tint, or tibiæ darker and femora largely metallic green.

Brownsville and New Braunfels, Texas.

The var. *texana* looks very distinct from typical *scripta* and maculate *confluens* and seems to be very near the Mexican *M. depressa*. The third antennal joint is relatively a little longer than in typical *scripta*. The head and prothorax is generally reddish with metallic tint and the elytra are usually as heavy or heavier marked than in typical *scripta*.

**Plagiodera flosculosa** Stal.

This is the *Lina flosculosa* of our list, which possibly does not occur in the United States. Stal's specimen was without locality but

it has been recognized from Mexico by Mr. Jacoby in Biol. Cent. Am., vol. VI, pt. I, p. 193, and is figured on tab. X, fig. 1 as *æneiventris*. It is not a *Lina* but a *Plagiodera*, at least, it is recorded under the latter genus by Mr. Jacoby.

***Zygogramma estriata* new species.**

Reddish-brown, elytra flavous with subsutural vitta confluent with the narrow sutural vitta, the former not reaching quite to base and of rather irregular outline and a number of relatively large, reddish-brown spots, which are surrounded by moderately large punctures. Head sparsely punctate. Prothorax strongly transverse, apical angles rounded; sides feebly arcuate; basal margin moderately arcuate; surface finely alutaceous with very few punctures, which are more numerous and coarser towards the lateral margin. Elytra convex; flavous with sutural and subsutural vitta confluent and numerous spots of variable shape reddish-brown, the punctures between these spots brown and not densely placed; the regular row of submarginal punctures absent; epipleuræ pale, except the exterior margin which is reddish-brown. Body beneath reddish-brown with very faint metallic tint; metasternum and abdomen sparsely punctate with moderately large punctures. Length 5.75 mm.

Huachuca Mts., Arizona.

This species is apt to be taken for a var. of my *Z. arizonica*, from the same region, in which the irregular dorsal vitta is broken up into spots. It differs, however, from that species by having a pale elytral epipleura and the absence of the regular row of punctures near side margin, which latter is present in all our species of *Zygogramma*. The form is also a little shorter and more convex than in *Z. arizonica*.

***Phyllobrotica vittata* Horn.**

My series of this species which are mostly from New York and New Jersey, show more variation than indicated by Dr. Horn from his four specimens in the remarks following the description.

The head above is generally black and in front yellow, but occasionally entirely yellow. The elytral vitta is more or less distinct or entirely absent and the ventral segments black, or the segments black with yellow margin, sometimes entirely yellow. The males have the antennal joints stouter than the females and the outer joints distinctly dilated.

***Agelastica alni* Linn.**

Three specimens of this European species were collected by Mr. G. P. Engelhardt on his office window of our Museum.

It is a large insect, similar in form to *Homophæta abdominalis* but a little more robust and entirely blue above. It belongs in the Galerucini and is placed in European catalogues in the neighborhood of *Exosoma*.

***Edionychis nigrosignata* new species.**

Form of *scalaris* Melsh.; flavous, shining; elytra with a common sutural spot about basal fourth and six spots on each elytron black, one on the humeral umbone, two at side margin, one about basal fifth and one slightly below middle, the other three are situated on the disk of which the one a little below middle is the largest, the upper one at about basal fourth and the apical spot at about apical fourth. Head impressed between the antennæ and more or less distinctly punctate, above smooth. Prothorax impunctate and shining. Elytra very minutely punctate and shining. Abdomen distinctly but rather sparsely punctate. Length 5 mm.

Brownsville, Texas.

This is undoubtedly the same as the Texas specimen mentioned by Dr. Horn in Trans. Am. Ent. Soc., vol. XVI, p. 195, in the remarks following the description of *scalaris*. It is relatively a little narrower than *scalaris*, the upper surface very shining and the elytra minutely punctate. The antennæ are pale with the eighth and ninth joints infusate. The black common sutural spot is variable in size and often absent, the upper submarginal spot is also absent in one or two specimens. The umbonal sulcus, prominent in *scalaris*, is in *nigrosignata* very feeble. The punctuation of the head is variable, in those with the interocular impression more feeble the few punctures are much smaller than in those with a broad median impression. The var. b. of the Mexican *Ed. signata* Jac. seems to be the only species from that region with which *nigrosignata* can be compared. However, the position of the four anterior spots in the former species is different and there is apparently no common sutural spot.

***Disonycha quinquevittata* Say.**

As defined by Dr. Horn this species is certainly an assemblage of very heterogeneous forms. Some of these have undoubtedly a name and are entitled to at least varietal standing but the descriptions are poor and it is necessary to make comparison with the types.

**Disonycha capitata** Jacoby.*D. capitata* Jac. Biol. Cent. Am. Col., vol. VI, pt. 1, p. 316.*D. quinquevittata* Jac. Biol. Cent. Am. Col., vol. VI, pt. 1, suppl. p. 276.? *D. pura* Lec. Proc. Acad. Nat. Sc., 1858, p. 86.

I have specimens from Phoenix, Ariz., which agree with the description of the above named species. The head is black at base and is generally more densely punctate than in any other species; labrum black, the surface of prothorax has usually only two black spots; each elytron with the usual black lines but they are mostly narrower and the submarginal one is sometimes obliterated or absent; the body beneath flavous, femora a little darker, apex of tibiae and tarsi black; punctuation of prothorax and elytra extremely fine or obliterated, but this is variable, in some specimens the punctuation of prothorax is distinct.

If my specimens are correctly identified as *D. capitata* Jac. there is another character not pointed out by Mr. Jacoby, and that is the relatively narrower prothorax in this species than in any of the different forms united under the name *quinquevittata*. There is a possibility that *D. pura* Lec. is the same, in which case this name has precedence.

Jacoby, very likely following Horn, places this species in the "Supplement" as a synonym of *quinquevittata*, but it ought to be recognized at least as a variety.

**Disonycha fumata** Lec.*D. fumata* Lec. Proc. Acad. Nat. Sc. Phil., 1858, p. 86.? *D. crenicollis* Horn. Trans. Am. Soc., vol. XVI, p. 204.

*D. fumata* Lec. is placed by Dr. Horn, l. c., p. 315, as a synonym of *quinquevittata* but I think wrongly. In none of the forms of the latter the two median thoracic spots are placed as closely together that they occasionally form a large central spot as described by Leconte nor is the underside "fusco-nigris" and anterior femora "fuscostaceis." *D. crenicollis* Horn is the only species known to me to which this applies.

*D. crenicollis* Say was described from Mexico and it is rather doubtful that this species occurs in the United States, at least Dr. Horn's identification of that species does not agree with Say's description, which is given below.



"*A. crenicollis*.—Yellowish; thorax five-spotted; elytra with black vittæ. Inhabits Mexico.

"Body pale yellowish; antennæ blackish; three basal joints honey-yellow, with a black line above; vertex with a black spot, thorax with two small dots, and an abbreviated line arranged triangularly, black, and a lateral, somewhat larger, oblique, oval indented black spot; scutel black; elytra impunctured, destitute of striæ; a common sutural black vitta, another in the middle, somewhat narrower than the intervening portion, and a submarginal one; pectus yellowish; postpectus and venter black, the latter with yellowish margins to the segments; feet honey-yellow; tibiæ and anterior and intermediate thighs with a black line. Length  $\frac{1}{5}$  of an inch."

According to the above description *crenicollis* has a five-spotted prothorax, a median elytral vitta which is a little narrower than the preceding yellow space; the underside yellowish, except the metasternum and abdomen, which are black, the abdominal segments with yellow margin; legs honey yellow, tibiæ, anterior and intermediate femora with a black line above. Dr. Horn's *crenicollis* has the median elytral vitta as wide or wider than the yellow space on either side, the abdomen yellowish or pale brown, the tibiæ and tarsi piceous, and the femora, especially the posterior one, more or less infumate and darker. Dr. Horn also states that it occurs from New York to southwestern Texas and Mexico, but I am rather doubtful of the occurrence of this species so far north. In the New Jersey list Prof. Smith records it from Hudson Co., Delaware valley and the Pine barren as not rare, but they are undoubtedly wrongly identified. A specimen from New Jersey received from Mr. Chas. Liebeck as *crenicollis* and others from various places in New Jersey, from Long Island and Kansas differ too much from the Texas specimens to be considered the same. These specimens are less elongate, the antennal joints decidedly shorter and stouter and the prothorax and especially the elytra generally distinctly punctate. They are very close to *arizonæ*, except that the abdomen is more densely punctate and the femora are generally clouded. It is possible that these are *punctigera* Lec. described from Kansas which name was placed as synonym of *quinquevitta* by Dr. Horn.

***Disonycha quinquerrutata* new species.**

Above flavous; head behind the eyes slightly darker, antennæ except the first joint below, two transverse spots on prothorax, a little above middle, scutellum, a sutural, discal and marginal vittæ black, the discal vitta narrower than the pale space on each side; a short line below the two discal spots on the prothorax and a more or less distinct larger lateral spot castaneous; body below pale except metasternum, posterior femora and tibiæ at apex and tarsi black.

Head shining, moderately coarsely punctate near each eye, median part smooth; tubercles distinct and slightly darker; antennæ long, reaching beyond the middle of elytra, joints rather narrow, third joint about twice as long as second, fourth about as long as second and third together, from the fourth slowly decreasing in length. Prothorax about twice as wide as long; sides feebly arcuately narrowing to apex; basal angles rounded; apical angles feebly thickened, oblique; surface smooth, shining. Elytra at base a little wider than the prothorax at base; sides feebly arcuate; surface minutely obsoletely punctate. Ventral segments of abdomen very densely and finely punctate; pubescence moderately long and dense. Length 5.75 mm.

Bill Williams Fork, Arizona, F. H. Snow (type); S. W. Utah (J. Chr. Weidt).

I received this species as *crenicollis* (*fumata* Lec.?) from Prof. Snow, near which it has to be placed. The form is slightly narrower, the antennæ longer and the coloration is different. The Utah specimen I bought some years ago from J. Chr. Weidt with the above name attached to it and supposed to be given by Dr. Horn, who identified some of his material.

***Disonycha latifrons* new species.**

Above flavous; head behind the eyes, labrum, antennæ, except the first joint below, two transverse spots on prothorax a little above middle, scutellum and a sutural, discal and marginal vittæ black, the discal vitta narrower than the pale space on each side; body below black, except underside of prothorax, median part of mesosternum, and apex of penultimate and last ventral segment flavous; femora reddish-yellow, without black line above; tibiæ and tarsi black.

Head smooth, shining, a few punctures near each eye; frontal tubercles indistinct, the space between the antennal insertion and apex scarcely convex; antennæ reaching to about middle of elytra, third joint longer than second but distinctly shorter than fourth, from the fourth gradually decreasing in length. Prothorax about twice as wide as long; sides feebly arcuately narrowing to apex; basal angles obtuse, feebly rounded; apical angles slightly thickened and a little prominent; surface smooth, shining. Elytra at base scarcely wider than the prothorax; sides feebly arcuate; surface minutely reticulate

and with fine punctures. Ventral segments of abdomen rather densely punctate and rugulose; last segment sparsely punctate and rather smooth; pubescence moderately dense. Length 6.25 mm.

Fort Defiance, Arizona.

The type is in the Museum collection, others are in the collections of Messrs. Wm. T. Davis and Ernest Shoemaker, to whom I am indebted for specimens.

Following Dr. Horn's table this species would be associated with his *crenicornis*, from which it differs in having stouter and shorter antennæ, the surface of the head smooth and even, the frontal tubercles obliterated and the decidedly black underside. The sculpture of the last ventral segment is in most of the species generally a little sparser than on the other segments but in this species the sculpture of the last ventral contrasts from that of the other segments, being nearly smooth and the punctuation sparse.

***Disonycha lodingi*** new species.

Form and coloration almost as in *caroliniana*. Head smooth, shining, with a few punctures in a fovea-like impression near each eye; frontal tubercles distinct; antennæ rather narrow and elongate, reaching to or a little beyond middle of elytra, third joint longer than second, but not twice as long, fourth longer than second and third together, from the fifth gradually decreasing in length. Prothorax fully twice as wide as long; sides gradually narrowing to apex; basal angles distinct but obtuse; apical angles oblique; surface smooth and shining. Elytra at base scarcely wider than the prothorax at base, sides arcuate; surface minutely reticulate with minute, obsolete, sparse punctures. Ventral segments of abdomen densely punctate and pubescent. Length 6 mm.

Delchamps, Alabama (H. P. Loding).

In form and coloration this species looks at first sight almost exactly as *caroliniana* but the antennæ are much longer with narrower joints and the ventral segments are more densely punctate than in that species.

***Disonycha alabamæ*** new species.

Oblong oval; above flavous; labrum, antennæ except the first three joints, scutellum, a sutural, discal and marginal vitta black; the discal vitta broad but placed nearer the lateral margin than the suture, and much wider than the outer pale space but much narrower than the inner pale space. Below pale, except the tibiæ near apex and tarsi black.

Head shining, moderately coarsely punctate above between the eyes, leaving, however, a narrow, somewhat elevated smooth space at middle; frontal tubercles distinct but flat; antennæ scarcely reaching to the middle of elytra, joints rather short and stout, second very smooth, third longer, but scarcely as long as the first, the following joints equal or subequal to the third. Prothorax slightly more than twice as wide as long; sides arcuate and feebly narrowing to apex; basal angles distinct, obtuse; apical angles slightly rounded; surface minutely alutaceous with small, sparsely placed punctures. Elytra not wider at base than the prothorax; feebly shining, but minutely reticulate, and finely punctate, punctures small and well separated. Ventral segments of abdomen shining and relatively very sparsely punctate; feebly pubescent. Length 5 mm.

Citronella, Alabama.

I have seen two specimens of this distinct little species and both collected by Mr. Loding; one of these is in his collection.

From all our vittate species it differs in the position of the dorsal vitta which is situated much nearer to the marginal than to the sutural vitta. In Dr. Horn's arrangement it has to be placed near *arizonæ*.

**Disonycha discoidea** Fab.

Var. *D. abbreviata* Melsh.

One of my specimens of *discoidea* from Kentucky has on each elytron a pale, subbasal spot in the centre of the black discoidal blotch, and also the apex of this spot is irregularly indented, suggesting the possible occurrence of specimens with a more or less well defined vitta. Vittate specimens would be very near *abbreviata*, which suggested to me the possibility of *D. abbreviata* being only a variety of *D. discoidea*. However, my specimens of the former were all from New Braunfels or Brownsville, Texas, and showed sufficient differences to discard this view. Lately in some material, loaned to me by Mr. Wm. T. Davis, I found a specimen from Kentucky which agrees better with Melsheimer's description of *abbreviata* than the Texan specimens. This is undoubtedly the true *abbreviata*, which was described from Pennsylvania, and nothing more than a variety of *discoidea*. The Texas specimens look superficially very much like typical *abbreviata* but show sufficient constant differences to entitle them to a name.

***Disonycha texana* new species.**

Above flavous; head behind the eyes, labrum more or less, antennæ, except the first joint below, scutellum and a sutural and discal vitta black; the discal vitta about as wide as the pale space on each side; body below pale but metasternum, tibiæ more or less and tarsi black.

Head smooth and shining, near each eye a foveiform puncture, frontal tubercles scarcely distinct; antennæ short and stout, reaching to about middle of elytra; second joint small, third longer but shorter than first, fourth a little longer than third, from the fifth feebly decreasing in length. Prothorax about twice as wide as long; sides feebly rounded and gradually narrowing to base; basal angles obtuse; apical angles slightly thickened and feebly rounded; surface smooth, shining; elytra slightly wider at base than the prothorax; sides feebly arcuate; surface moderately showing, sparsely and very minutely punctate. Ventral segments shining, sparsely punctate; pubescence short and sparse. Length 5.25 mm.

Brownsville (type) and New Braunfels, Texas.

This species undoubtedly stands in collections as *abbreviata*, but is more parallel, the elytra almost smooth, the antennæ shorter, and the scutellum and metasternum are always black. The Mexican specimens recorded with a little doubt as *abbreviata* by Mr. Jacoby in the *Biologia* seem to be the same as the Texas specimens.

***Phyllotreta liebecki* new species.**

Similar in form and color to *vittata*, but surface smoother and a little more shining and æneous; elytra with a moderately broad yellow vitta; extending to the extreme apex incurved at scutellum, dilated below humerus and strongly so near apex, the apical part curved inwards, and extending to the suture. Head alutaceous, distinctly punctate. Prothorax about twice wider than long, sides arcuate, slightly narrowed in front, surface alutaceous, punctures moderately coarse and close. Elytra slightly wider at base than the prothorax, humeri obliquely rounded; moderately coarsely punctate, punctures much finer towards apex. Body beneath piceous, abdomen and posterior femora with a feeble metallic tint; abdominal segments rather sparsely punctate. Length 1.75 mm.

Male.—Last ventral rather feebly lobed with a moderate transverse impression at tip; antennal joints two and three subequal, fourth distinctly shorter than the preceding joint, fifth a little stouter than in *vittata*, sixth short, oval, seventh to tenth subequal and less elongate than in *vittata*, eleventh slightly longer than the preceding joint.

Female.—Third and fourth antennal joints nearly equal, fifth longer than either the fourth or sixth, the latter elongate but shorter and less stout than the seventh, seven to ten equal, eleventh a little longer than the tenth.

Enterprise, Florida.

This species differs from *vittata* by the broad vitta which reaches the apex where it extends to the sides and suture, more distinctly metallic surface, smoother and more shining elytra and different male sexual characters. It seems to be, however, more closely allied to *robusta*, which seems to have a similar vitta but in that species the fifth antennal joint is prolonged at apex and the last ventral has a very deeply impressed median line.

For specimens of this species I am indebted to Mr. Chas. Liebeck who called my attention to the possibly wrong identification of this species as *robusta* by Mr. Blatchley.



## A NEW CICADA OF THE GENUS MELAMPSALTA.

BY WM. T. DAVIS,

STATEN ISLAND, N. Y.

For some time the writer has been convinced that the little green Cicada mentioned by Thomas Say in connection with his *Cicada parvula*, now considered to be the same as *Melampsalta calliope* Walker, was really a distinct species separated by its smaller head, differently shaped body and genitalia, also by having five apical cells in hind wing.

Pending a longer paper on the genus with illustrations, the following description is presented.

### **Melampsalta kansa** new species.

Type male, Meade, Kansas, July (Warren Knaus). Davis collection.

Allotype female, Tascosa, Texas, June 28, 1919 (Miss M. McGill). Davis collection.

Head small, not quite as broad across the eyes as the width of the pronotum; wings proportionately broader than in *calliope*, uncus when viewed in profile not as curved as in that species; body slim with the sides more parallel than in *calliope*, and in the female the abdomen tapers more gradually. The ocelli are ruby colored as in *calliope*, but the body color and venation of the wings is grass green and not straw colored, and the male is without blackish marks on the thorax. The membranes at the base of both pairs of wings are almost white in color. Beneath the opercula are ample and rounded at the extremities, which come quite close together, whereas in *calliope* the extremities are quite far apart. The notch in the last ventral segment of the female

is deep in both species. The color of the underside is green, but lighter than above, and the tarsal claws, spines on fore femora, tip of rostrum and ovipositor, are darkened. In this species the males and females are more nearly of the same size than in *calliope* from Kansas and Nebraska.

#### MEASUREMENTS IN MILLIMETERS.

	Male Type.	Female Allotype.
Length of body .....	13.5	15
Width of head across eyes .....	4	4
Expanse of fore wings .....	31	33

In addition to the type and allotype the following specimens have been examined:

Kansas.—Ellis Co., July 13, two females, received through Paul B. Lawson and M. C. Tanquary from Dept. of Entomology, Kansas State Agricultural College. I have seen three other green specimens from Kansas.

Texas.—Fredericksburg, Gillespie Co., May 29, 1906, male (J. D. Mitchell).

#### MISCELLANEOUS NOTES.

**A dark form of *Stagmomantis floridensis*.**—In the original description of this species published in the Bulletin of the Brooklyn Entomological Society, February, 1919, the statement was made that all of the twelve females examined, including the type, were green in color. Lately Mr. Joseph Lienhart was requested to secure any mantids that he saw, and as a result he sent one male, six green and two brown females of *Stagmomantis floridensis* from Rye, Manatee County, Florida, collected in September and October, 1919. While gray and brownish specimens of *Stagmomantis carolina* are not uncommon, the two above mentioned dark-colored *floridensis* are the first to be recorded. The discal spot on the tegmina in these specimens is more pronounced than in the green individuals of the same species.—WM. T. DAVIS.

**A belated *Tibicina cassinii*.**—Dr. Leonard Haseman, of the University of Missouri, has kindly sent to me a letter from Miss Mary E. Dewey of Luray, Clark County, Missouri, together with the Cicada

mentioned therein, concerning which Miss Dewey reports as follows: "Enclosed find a box containing a cicada. Last Wednesday (October 15, 1919), while spending the day in the woods, I heard the notes of a cicada and the enclosed is what I found. It was on a maple tree. What kind of a cicada is it, and what is it doing out of the ground this time of the year?"

The cicada was a male *Tibicina cassinii* (Fisher), usually considered a variety of the seventeen-year cicada, and Miss Dewey may well ask what it was doing out of ground as late as October 15. As is well known *Tibicina cassinii* normally appears about the last week in May, together with the larger *Tibicina septendecim*, or its thirteen-year race, and by the middle of July the insects are all dead, so the record of this remarkably delayed individual is of much interest. Dr. Haseman reports that the insect was apparently freshly collected when it reached his hands.

Cicadas of the genus *Tibicen* are often heard late in the fall, and this year several *Tibicen sayi* were singing at St. George, Staten Island, as late as October 11, a very warm day. With the seventeen-year cicada and its variety, it is, however, usually very different, and as has been stated the insects are commonly all dead by mid-summer.—WM. T. DAVIS.

**Miscellaneous Collecting Notes for 1919.**<sup>1</sup>—Butterfly collecting, in the vicinity of New York City, has been, like last season, exceedingly poor. Until nearly the end of March there was every promise of a very early spring and hopes ran high for a good collecting year. This was borne out by a very early butterfly record by A. B. Klots, *viz.*, a male specimen of *Lycænoptis pseudoargiolus* f. *vern. lucia*, on March 25.

On the night of March 27, however, a very severe frost set in, the cold spell lasting until April 2. Relatively few *pseudargiolus* were noted after this. On April 25 we were treated to another severe frost, this being the coldest April 25 in the history of the Weather Bureau, the minimum temperature being 27° F. This cold weather only lasted two days. It seems possible that these two cold spells have had something to do with the poor collecting.

A trip to Greenwood Lake, N. J., was made on May 4 with Mr. E.

<sup>1</sup> Read before The New York Entomological Society, Oct. 7, 1919.



L. Bell and some friends. The collecting was very poor, only eleven species and two varieties of butterflies being noted. Among these was *S. geneutia*, which was rather common, and a single *Incisalis henrici*, captured by Mr. Bell.

Some of the Rhopalocera which were very common this year are, *P. glaucus*, *P. troilus*, *V. virginiensis*, *V. atalanta* and *D. archippus*. *V. cardui*, absent for several seasons, is with us this year, though not very common. *E. philodice* is commoner than it was last year but is by no means in its normal abundance. *Danaus archippus* Fabricius has been to date, very scarce, only about one half dozen specimens and one larva being observed, which records were all in September. This is the first year that I can remember of this species being scarce.

Microlepidoptera were plentiful throughout the season. Larvæ, in contrast with last season,<sup>2</sup> have been quite numerous.

*Butterfly Migration*.—A steady stream, of what was taken to be *Catopsilia cubule* were observed about noon on September 4, flying due north across Charleston Harbor, S. C. A light wind was blowing, probably northwest; later in the day it became a fresh breeze from the east. About one dozen of these butterflies were in sight at a time across the harbor. They flew about 5 to 15 feet above the water. With the *cubule*? were a few *Polygonia* sp. (John T. Nichols).

A swarm of a Pierid, looking very much like *Tachyris margarita* on the wing, was observed Sept. 3, about 25 miles from shore, and about 50 miles north northeast of Cape Hatteras, N. C. They flew about 25 feet above the water and were headed about south southeast with a light wind behind them. The number of individuals seen is estimated at fifty, one being seen every two to three minutes, the swarm passing by in about two hours (John T. Nichols).

*Catopsilia cubule*, three or four seen at Mastic, Long Island, N. Y., Sept. 14 (John T. Nichols).—FRANK E. WATSON.

<sup>2</sup> Butterfly Collecting for the Season of 1918, Watson, JN. N. Y. ENT. Soc., 1918, XXVI, p. 228.

## PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 20.

A regular meeting of the New York Entomological Society was held at 8:15 P.M., on May 20, 1919, in the American Museum of Natural History, Mr. Harry G. Barber in the chair, with sixteen members and two visitors present.

The Librarian reported accessions and valuable donations from Mrs. Edw. D. Harris, which latter the Secretary was instructed to gratefully acknowledge.

The Treasurer reported a donation of \$25 from Mr. Howard Notman, which he had acknowledged for the Society.

Dr. Bequaert, for the Field Committee, reported further on the Decoration Day excursion to Great Piece Meadow.

Letters were read from Pres. L. B. Woodruff and from Mr. R. P. Dow.

Mr. Burns exhibited a new lining for insect boxes called "Universal Insulite" made by the Fireproof Products Co., 257 East 133d St., New York, for building purposes. It is a wood pulp preparation, soft enough to take the pin easily and so elastic that no permanent hole is made by the pin. No corrosion of the pin seemed liable to occur. The price, four cents per square foot, was an added advantage.

Mr. Engelhardt spoke of bolsa wood as another substitute for cork linings, that was very satisfactory but unfortunately not cheap.

Mr. Schaeffer exhibited a box of Chrysomelidæ and spoke at length of their taxonomy and synonymy. As his remarks will be printed later in full, they are not reported here except as to the local record for *Agelastica alni* L. which had been taken by Mr. Engelhardt on his office window in Brooklyn; and the raising by the same member of the longhorn *Saperda horni* Joutel, from willow sent to him by Tom Spalding, from Provo, Utah, which greatly extended the range previously recorded, viz: No. Cal., Wash.

Mr. Shoemaker exhibited a large number of Coleoptera he had found near Washington, D. C., including *Cicindela unipunctata*, July 12, near Mt. Vernon, Va., the second specimen recorded from vicinity of D. C., *Euphoria herbacea*, found flying rapidly near Great Falls, *Lebia*, *Amara*, *Oberea flavipes* and *ruficollis*, *Disonycha discoidea* and a great copperhead snake, 32¾" long, from Great Falls, Va., July 13, 1918, with which he had personal experience.

Mr. Olsen exhibited and commented on some of the Hemiptera Mr. Shoemaker had found.

Dr. Bequaert exhibited some beetles from nests of the ant *Formica exsectoides*, including *Megastilicus formicarius*, *Hetarius brunnipennis*, two species of Pselaphidæ, etc., from Greenwood Lake, N. J.

## MEETING OF OCTOBER 7.

A regular meeting of the New York Entomological Society was held on October 7, 1919, in the American Museum of Natural History, President L. B. Woodruff in the chair, with nineteen members and several visitors present.

Dr. Lutz announced the death, on September 12, of Dr. E. G. Love, a former officer of the Society and long its delegate to the Scientific Alliance. The Secretary was instructed to enter this minute expressing the regret of the Society and to convey the same by mail to his family.

Greetings were received from W. J. Chamberlin and Raymond C. Osburn.

Mr. Davis referred to the death in an aeroplane accident of the entomologist Emerson Liscum Diven, who made a survey of cotton cultures by aeroplane from Brownsville to El Paso, Texas.

The President called for reports of summer collecting—

Mr. Hall had visited Mt. Washington, with poor success on account of cold and wind.

Mr. Comstock had visited New Orleans, with small opportunities which had, however, yielded some interesting Lepidoptera.

Mr. Watson made a report upon the season's collecting locally, which will be printed elsewhere.

Mr. Bell had spent the last two weeks of July in northern Vermont, collecting Lepidoptera.

Mr. Shoemaker had spent July 5 to July 12 in the Catskill Mountains devoting his energy in part to sugaring, with good results in Lepidoptera and with a dozen *Cychnus viduus* also caught at sugar. September 13 to September 23 had been spent about Washington, D. C. *Cicindela splendida* and var. *transversa* was found near Mt. Vernon on a path through the woods. Several rare Carabids were found at Black Pond, up the river, including *Cychnus ridingsi* and *shoemakeri*.

Mr. Burns had spent a week at Ithaca, four days at Wading River, L. I., and many days on Staten Island. *Hippopsis lemniscata* was thereby added to Staten Island List. He showed also a collection of Asilidæ.

Dr. Bequaert exhibited *Ceraturgus aurulentus* Fab. type locality of which was New York, though until ten years ago, when C. W. Johnson found it in New Jersey, it was regarded as a lost species. Dr. Bequaert's specimen was found in Van Cortlandt Park and in Mr. Burns's box was another from Singac, N. J. He also exhibited *Promachus rufipes*, one of the largest robber flies, *P. fitchi* and *Bombylius incanus*, the latter from Blue Hills, where with Prof. Wheeler he had found very good collecting. The vicinity of Boston appealed strongly to him and the Arnold Arboretum was specially fine for insects.

Mr. Barber reported poor results at Great Piece Meadow and Lakehurst, N. J., and at Falls City, Nebraska, where he had spent two months.

Mr. Olsen exhibited *Eutettix osborni* Ball, identified by Dr. Ball, found September 4 on Tamarisk growing in Museum grounds. This species was

described from Texas and has not yet been found at any intermediate locality.

Dr. Bequaert suggested that it might possibly prove to have been introduced with the tree.

Mr. Sherman had spent the summer at Peaks Island, near Portland, Me., making an auto excursion to Eastport, where he camped for four days at Lake Meddybemps with forest all around it. The peat bog behind the forest yields a supply of surgical sphagnum and contains puddles in which live desirable species of *Hydroporus*. Later in the summer Mr. Sherman had visited Mr. Henshaw, who grows younger every year, he said, and Mr. Fall, at Tyngsboro, and then camped on August 9, at Hermit Lake, in the White Mountains where *Scutopterus angustus* again rewarded his search.

Mr. Nicolay reported his capture of *Buprestis salisburyensis* at Malaga, N. J., *Anthophilax viridis* and *Centrodera decolorata* in the Pocono Mountains, Pa., *Chrysobothris blanchardi* at Kingston, R. I., and *Cychnus canadensis* in the Shawangunk Mountains, N. Y.

He spoke also of the spreading of *Plagioderma versicolora*, which has become a pest about Orange and Maplewood, N. J.

Mr. Weiss said he had been working with Mr. Dickerson on insects affecting evening primrose and upon fungus insects of which a list of about 100 species was now ready.

Dr. Lutz spoke briefly of his expedition to Colorado, where most of his collecting had been done at elevation running from 7,000 to 13,500 feet. He had started at the southern border 3,500 ft. elevation, but had soon reached greater elevations, so that Colorado collecting began in that respect where Mt. Washington left off.

Mr. Mutchler reported the important gifts received by the Museum of the late Charles Palm's collection of Coleoptera and of the Cerambycidae and Scarabaeidae of Geo. W. J. Angell's collection.

Mr. Neilsen reported local work in Westchester County, N. Y.

Mr. Davis agreed with Messrs. Watson, Bell and Hall that butterflies had been scarce; he reported *Callidryas eubule* on Staten Island September 13, and said that for many years that species had appeared there about the middle of September. He also read a paper on Katydid (which will be published in the JOURNAL) showing their possible extinction on Staten Island, though still plentiful on Long Island.

This subject and its cause were discussed by Dr. Lutz, who thought it might result from parasites unduly multiplied and by Miss Brace and Dr. Marchand, who were present as visitors. The latter spoke of the great abundance of *Microcentrum* at Princeton, N. J., in the fall of 1917.

#### MEETING OF OCTOBER 21.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., October 21, 1919, in the American Museum of Natural History, Vice-president John D. Sherman, Jr., in the chair, with seventeen members present.

Mr. J. William Decker, 250 East 21st St., New York City, was elected a member.

Letters from Mrs. E. G. Love to Mr. Woodruff, indicating a desire to sell her husband's collections, were read. A portrait of the late Edw. D. Harris in the "New York Genealogical and Biographical Record" was exhibited.

Mr. Davis read a paper on "Cicadas of the genus *Okanagana*," especially interesting in establishing the route of Nuttall's expedition, on which the types of many of Say's species were collected. Numerous specimens were exhibited.

Dr. Bequaert made some "Remarks on the North American Fossorial Wasps of the genus *Aporinellus*" illustrated by specimens and prefaced by an account of the collecting places afforded by Boston's park system.

Mr. Weiss gave some "Notes on Fungus Insects" illustrated by specimens of the insects and their food. These papers will all be printed later.

Mr. Sturtevant exhibited Syrphidæ from Woods Hole, Mass.

Mr. Comstock spoke of the cotton moth swarming at Washington, D. C., October 1, 1919, and abundant at Nashua, N. H., October 5 and 6.

Mr. Davis reported the same moth abundant at Rye, N. Y., and on Staten Island, October 12, two specimens even traveling with him on the Staten Island ferry boat.

#### MEETING OF NOVEMBER 4.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., on November 4, 1919, in the Public Museum of the Staten Island Institute of Arts and Sciences, President L. B. Woodruff in the chair, with eight members and eleven visitors present.

Mr. Davis reported for Outing Committee four members, accompanied by Mr. Chapin, had spent the afternoon sifting in the Clove Valley.

Mr. Leng presented for Dr. David Sharp, Brockenhurst, England, a continuation of his Studies in Rhynchophora entitled "The Sexes of *Conotrachelus brevisetis* Champ" which was referred to the Publication Committee.

Dr. W. Marchand, 226 East 15th St., New York City, was proposed for active membership by Mr. Watson.

Dr. Bequaert spoke on "Collecting Experiences in the Dark Continent" illustrating his remarks with lantern slides. He showed first the location of the rain-forest and grass-land and then gave illustrations of the fauna and flora of each. Among the insects the Tsetse fly received special attention from its economic importance, but characteristic wasps, ants, termites, etc., were also shown. His presentation of the subject was closely followed by the members and greatly enjoyed.

Mr. James P. Chapin gave some of his personal experiences in the same region.

Mr. Davis exhibited the house cricket of Europe, *Gryllus domesticus*, found at Prince's Bay, Staten Island, in the dwelling of Mrs. Hucklenbruck. He also exhibited a specimen of *Tibicen cassinii* Fisher, received from Mr.

C. Haseman, Luray, Clark Co., Mo., with the date October 15, and commented on its unusual lateness, its date of appearance on Staten Island being the month of June.

Mr. Burns exhibited a branch of ash one inch in diameter and about three feet long, the surface of which was entirely covered by the workings of the Scolyted beetle *Hylesinus aculeatus*, saying that he had found it during the afternoon in the Clove Valley.

#### MEETING OF NOVEMBER 18.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., November 18, 1919, in the American Museum of Natural History, President L. B. Woodruff in the chair, with seventeen members and two visitors, Dr. Janvrin, of the Linnean Society, and Mr. Herbert Ruckes, of Cornell University, present.

Dr. W. Marchand, 226 East 15th St., New York City, was elected an active member of the Society. Letters were read from R. P. Dow and L. R. Reynolds. Mr. Davis exhibited photographs of the field meeting of November 4 and of the authors of the Rhynchophora of N. E. America.

Mr. Woodruff spoke of "Some Membracids of the genus *Ophiderma*" and exhibited the insects referred to. Mr. Notman gave "Notes on some species of *Bembidium*" illustrated by series collected by himself in the Adirondacks. These papers will be printed.

Mr. Wm. T. Davis showed a female of the Noctuid moth *Merolonche doli* Barnes and McDonnough, collected at Lakehurst, N. J., April 29. The specimen is rubbed but evidently belongs to the species mentioned, which has not before been reported from the state of New Jersey. The species was described and figured in "Contributions to the Lepidoptera of North America," vol. IV, 2, May 15, 1918, and the type came from Central Park, Long Island, N. Y.

Mr. Olsen spoke of the accident by which Mr. Nielsen had suffered a fractured heel bone.

Mr. Woodruff exhibited the insects he had collected during his recent stay in California.

#### MEETING OF DECEMBER 2.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., on December 2, 1919, in the American Museum of Natural History, President Lewis B. Woodruff in the chair, with seventeen members and several visitors present, including Mr. Herbert Ruckes, Mr. Carl Heinrich and Mr. H. H. Johnson.

On motion by Dr. Lutz, the Secretary was instructed to request the Publication Committee to have actual date of publication appear on each number of the JOURNAL.

Dr. Lutz read a letter from Dr. Raymond C. Osborn, identifying the following flies:

*Eumerus strigatus*. Introduced from Europe, known from Canada, Ohio, etc., and found by Dr. Lutz at Ramsey, N. J.

*Criorhina pictipes*. North Carolina, Ohio and also found by Dr. Lutz at Ramsey, N. J., and new to New Jersey List.

*Xanthogramma emarginata*, a male in which the second and third abdominal bands are not emarginate but separate.

Mr. Davis exhibited *Stagmomantis* and made some remarks that will be printed in short notes.

Mr. Leng exhibited *Dinapate wrightii* Horn.

Mr. Heinrich, present as a guest, spoke of his pleasure at being able to attend the meeting.

# INDEX TO NAMES OF INSECTS AND PLANTS IN VOLUME XXVII.

Generic names begin with a capital, specific names with a small letter.  
New genera, subgenera, species, subspecies, varieties and *nomina nova* are  
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